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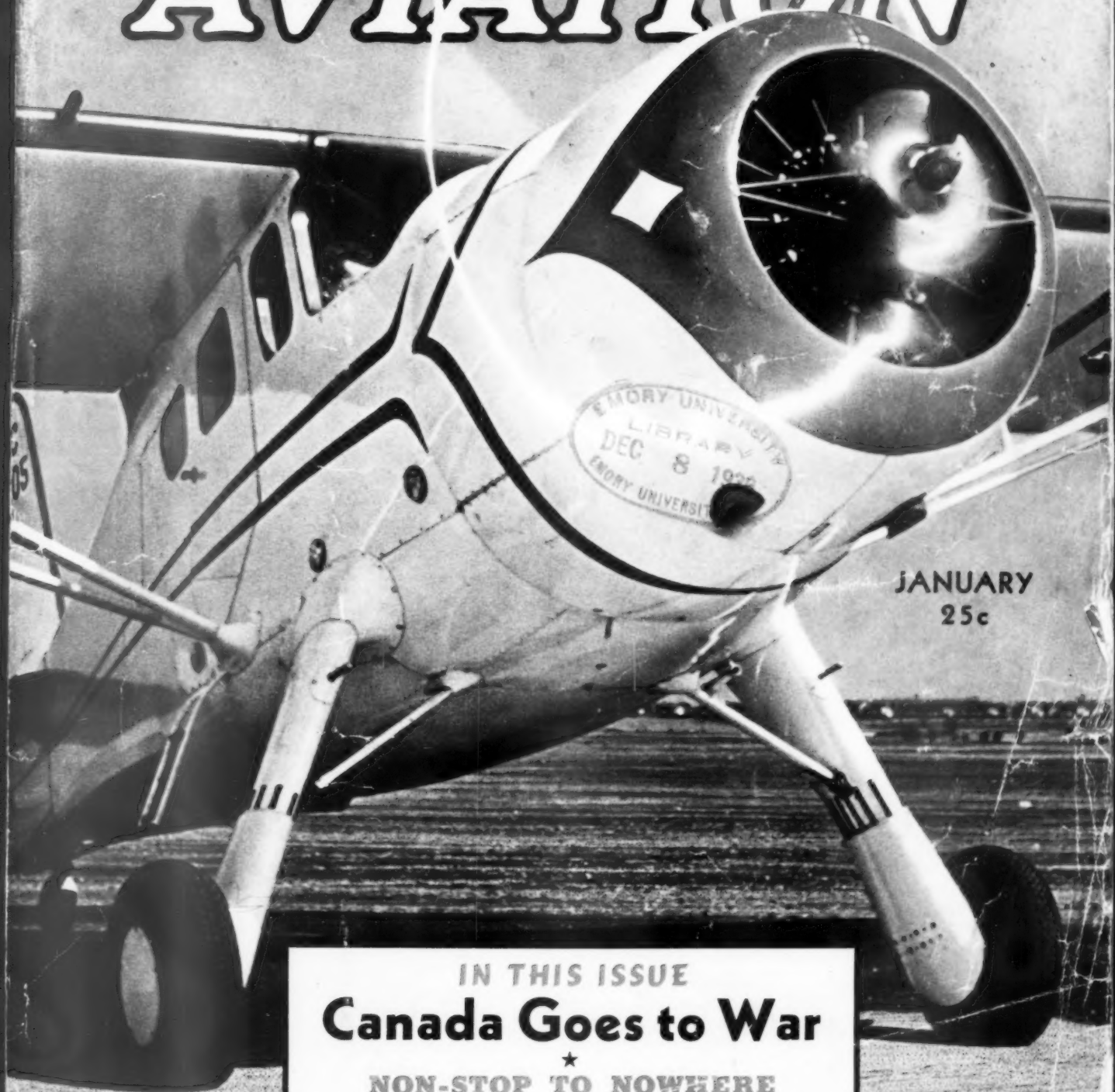

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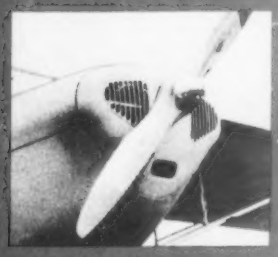

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The Birdmen's Perch

Shortly after this appears, that original commercial flyer, St. Nick, will be banking in from the North Pole with a full pay load. In tune with the season, we want to say "Merry Christmas" and "Thanks for your letters" to all our 1939 contribs. And maybe toss in a hint along with our greetings to the rest—including a few old correspondents who must have lost their pencils—that we'd like to start 1940 out right with a Whopper, puzzle answer, or plain old-fashioned letter from you. Happy Landings!

"Tattered Wing-Tips," Ed., The Birdmen's Perch, Room 3800, Gulf Building, Pittsburgh, Pa.

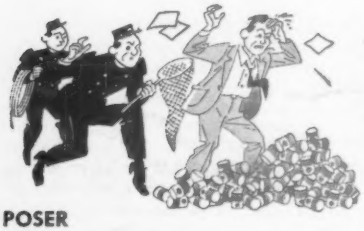
LEXICOGRAPHER'S CORNER

The other day we had a letter from Ivan Daggitt of Benton Harbor, Mich. Said Ivan:

"The available definition of *electricity* is 'an imponderable and invisible agency, capable, under different circumstances, of producing light, heat, chemical decomposition, and other physical phenomena'."

What Ivan wants to know . . . since *electricity* is so hard to define . . . is anyone able to supply a good definition of the *aviation bug*? The one that bites people about two minutes after their first take-off.

Let's have your ideas, chums. We've been wondering for more years than we like to mention just what the critter does look like.



POSER

Here's a problem that put four of our smartest friends in straight jackets. Like last month's, it's from J. L. Centanni of New Orleans. Thanks again, J. L. Thanks also to Edward Bybel of Bayonne, N. J., who sent in the same puzzle just a few days later.

A pilot had a certain number of quart cans of Gulfpride Oil (advt.). He divided them among four mechanics as follows:

Mechanic A received ½ the quart cans plus a pint

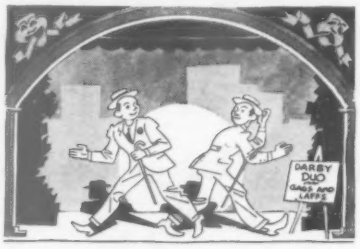
Mechanic B received ½ the remainder plus a pint

Mechanic C received ½ the remainder plus a pint

Mechanic D received one quart can

No opening of the cans was involved. How many cans did he have?

(T.W.T. is convinced that this is one of the trickiest problems printed in the Perch. So we're going to print an Honor Roll of those who get it. Send in your answer right away.)



THAT-WAS-NO-LADY DEPT.

One of the hardest things to pay attention to is an old story. Even if the boss is telling it.

But there's one story we've been telling now for ten years and which, in the interest of flyers generally as well as ourselves, we think is worth repeating for ten more. It's the story of what the Alchlor Process does to Gulfpride Oil that makes it like no other oil in the world.

You see, the Alchlor Process is not just an ordinary refining step. It's a Gulf-invented refining miracle—*used in addition to conventional methods*—that digs up to 20% more carbon-and-sludge formers out of the 100% Pure Pennsylvania . . . makes Gulfpride the world's finest motor oil for planes.

THIS MONTH'S WHOPPER

Dear T.W.T.

I intended charging you $75 for misrepresentation of your Gulf Aviation Gas which resulted in the eradication of my antedeluvian biplane. But since it also saved my life, I'll let the money pass.

Here's how it came off:

I'm a barnstormer and when I thunder over the county fairs doing (in a following wind) as much as 60 m.p.h., crowds flock in for miles around to ride at $1.2 per head (75¢ to hang on the wing).

One day I try your Gulf Aviation Gas and what happens? I give her half throttle, she scorches down the pasture at 162.4 m.p.h. and the top wing fabric starts peeling off. As the bottom wing is only eight or nine years old, I am not much worried. I always did want a fast low wing job. So when the whole business blows away, I merely say to myself, "Now for the speed test."

WOW! When I shoved the throttle forward, she accelerates like a rocket ship. Then the air resistance tears off the remaining wing, motor, and everything else.

Naturally, I'm quick-witted, so in that fraction of a second I remember your ad saying "Gulf Aviation Gas will never let you down."—So I grab the gas tank and perch up there till two days later when some guys come along in an autogyro.

From now on you better warn us fellas who are just starting to use Gulf. So you won't forget, I'm enclosing a bill for the T.N.T. we used to blast that tank outa' the way of airliners.

W. T. Hodge

Gu[illegible]poration and Gulf Re[illegible]ny . . . makers of

[illegible]LF

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POPULAR AVIATION, Vol. XXVI, No. 1, January, 1940. Published monthly by Ziff-Davis Publis[illegible] Chicago, Ill., U. S. A. Subscription $2.50 per year, single copies 25 cents; foreign postage $1.00 per year e[illegible] [illegible]ond class matter, January 24, 1933, at the Post Office, Chicago, Illinois, under the act of March 3, 1879.

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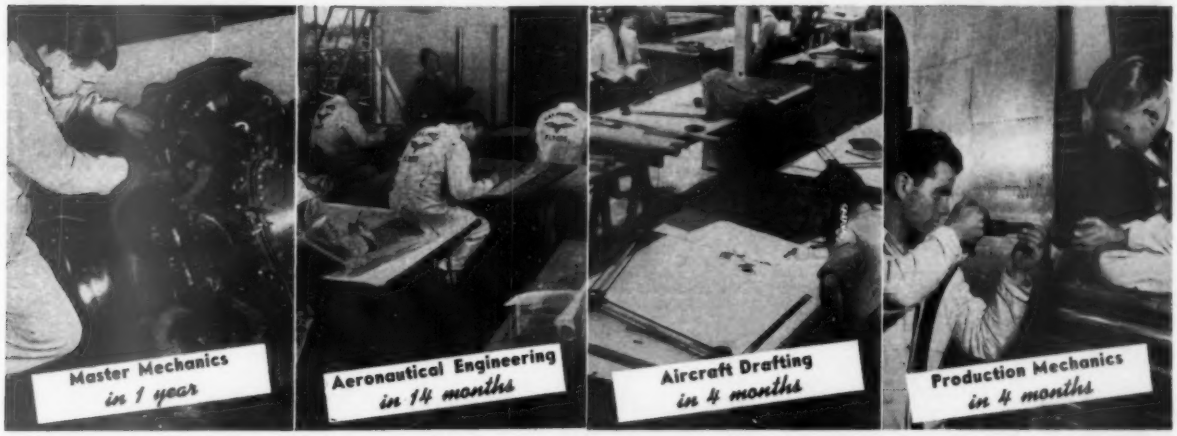

and THERE ARE 5 REQUESTS FOR EACH GRADUATE

"I am a California Flyers Graduate." It means something to say that. It means that aviation wants you to the extent that over 98% of all California Flyers graduates are employed in the industry and that there are more than 5 employers' requests for every student now enrolled. It is a passport into aviation. Secondly, it means that you are a man marked to succeed like the California Flyers graduates before you. And that is what *really* counts.

Why does a California Flyers man stand so high? It is obvious once you have heard the complete story of this famous school. Its founders believe that aviation should be taught in a school where the student remained an individual—learning aviation as it pertains to his individual ambitions and qualifications, and by so doing preparing *him* for the responsibilities of leadership. This way the graduate is prepared to meet today's aviation problems and to contribute to tomorrow's aviation advancement. This is the way today's leaders learned. Only this way can a training program be built for the industry, on industry's specifications. They believe too, that the entire field of aeronautics:—engineering, mechanics and piloting are all closely interwoven and that a student should train in a school that teaches all of these important divisions. Above all, they believe that aviation should be taught in an environment of aviation activity, taught where the greatest aviation developments originate, taught where there is the greatest number of men actively engaged in aviation. This is why California Flyers is located in the heart of the world's aviation capital on the world's busiest testing field.

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MILITARY aviation secrets continue to leak out of this country. Now, more than ever, it is vital that these leaks be plugged. Yet, we received another in a long line of shocks the other day, while thumbing through a German magazine—the official organ of the German air force. We came across a detailed drawing of a six-engined, "highly secret" bomber now under construction for the Army Air Corps. The drawing contained several explanatory numbers referring to complete details in a descriptive paragraph below. That drawing showed the exact location of armament, bomb stowage points, crew positions—everything of importance from a military standpoint.

This sort of thing is not new to us. Information concerning dozens of "highly secret" military aircraft has been forbidden to American publications, only to have the inevitable drawings and descriptive data turn up shortly in a German, French, British or Italian aviation publication.

It is of *vital importance* that every American do his or her share to help us plug these leaks—immediately.

* * *

ONE of the best things that's happened to private flying in a long time is the CAA's new policy of tracking down and prosecuting reckless flyers. We had been hoping for years that the Government would start policing flyers to the extent that the deadly show-off and the careless, irresponsible student pilot would find their death-defying practices too uncomfortable to continue. The CAA's Air Safety Board has at last tackled the problem and we have heard nothing but favorable comment from the aviation industry. Nothing has done so much to hurt aviation as the careless, ignorant flyer. No amount of explanation ever will overcome entirely the stigma of a bad accident caused by sheer laxness. But with the CAA tracking down violators, fining them or revoking their licenses, we can begin to see the end of the smart-aleck flyer.

* * *

WE think "Non-Stop to Nowhere" is as entertaining an article as we've read in a long time. Baxter and McDaniels did a particularly good job of telling their experiences. As our deadline for this issue drew closer, though, we began to grow fidgety lest the boys decide to go after some astronomical non-stop flight record. However, although the boys didn't know it at

(*Continued on page* 89)

POPULAR AVIATION

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Cover Photograph: Howard monoplane by Hans Groenhoff

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Practice bombs are fitted to a Canadian warplane trainer as its pilot looks on.

Canada Goes to War

by

JAMES MONTAGNES

Far from the battle fronts, Canada nevertheless is fighting her enemy in the skies.

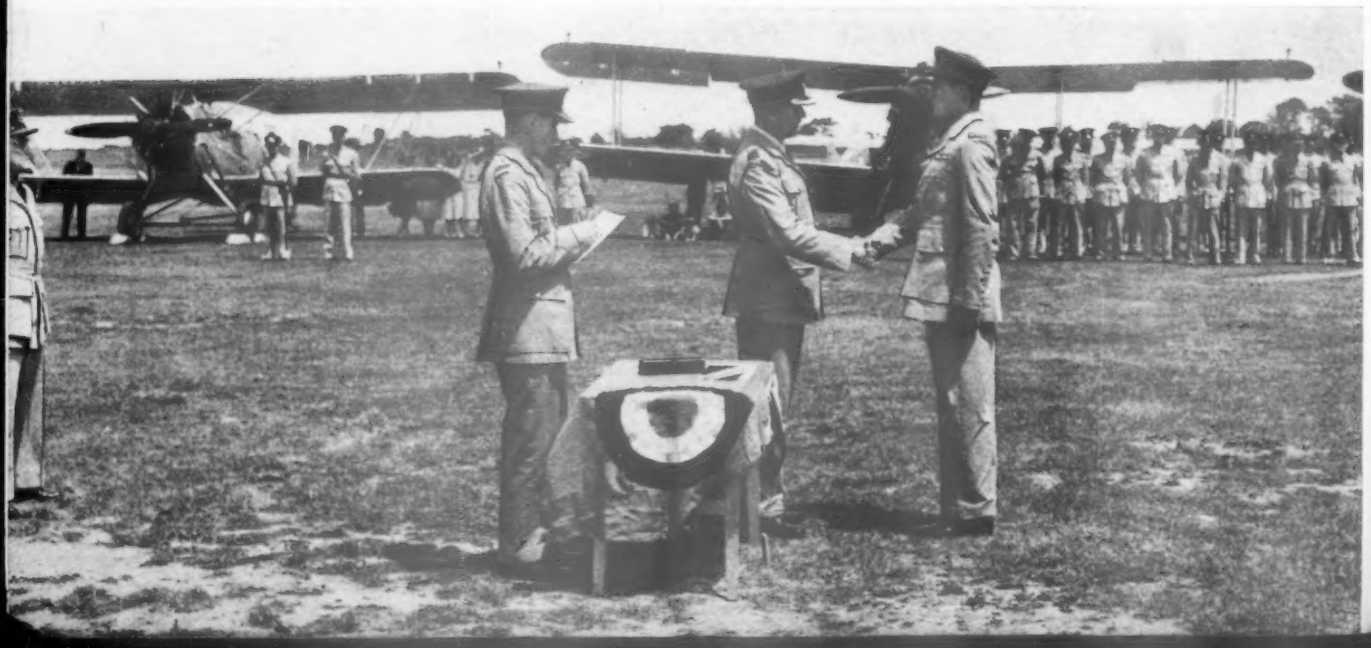
CANADIAN airmen are expected to be among the first of Canada's armed forces to go to Europe and airplanes from Canadian airplane factories will play a leading role in the air battles of the present war, according to all reports from Ottawa, the Dominion capital. Thus history repeats itself for, during the World War of 1914-1918, Canada sent more than 13,000 airmen overseas, four of whom (Bishop, Collishaw, Barker and McLaren) together brought down 230 enemy airplanes, more than any four airmen of any other country. Canada manufactured 2,900 fighting and training airplanes.

Canada's aviation role in the present war is on three fronts. First—the Royal Canadian Air Force must defend the Dominion's Atlantic, Pacific and Arctic coasts. The unfortified border between Canada and the United States is expected to so remain. Second, Canada will send fighting units of her air arm to the war front when called on by Great Britain. Third, Canada has been preparing to become the great airplane supply center for the British armed forces.

During the past few years Canada has been quietly preparing both her air force and her airplane industry against a possible war. There has been little publicity of either undertaking and, when Canada, on September 10, followed Great Britain in declaring war on Germany, Canadian aviation was prepared.

Canada has never had a large airplane manufacturing industry. Most commercial and fighting planes have been imported from the United States and Great Britain. There have been a number of small plants manufacturing light air-

The training of flying cadets is an extremely vital war role for Canada. Below are graduating airmen.



Though Canada undoubtedly will not be gassed, students wear masks for practice.

planes for private flying, for training and some for commercial freighting in the northland. During the past year this picture has changed. Rumblings of a possible war brought British military missions to Canada in 1938, the results of which were the placing of "educational" orders for bombing airplanes in Canada.

Meanwhile Canadian airplane manufacturers, to keep their plants busy, sought orders for airplanes in Central and South America. Airplanes, both trainers and fighters, have been built in Canada in the last two years for various Central American governments and some ostensibly ordered for the Turkish government.

This has all been experience for the Canadian airplane industry, which began expansion early in 1939 to take care of orders for bombing, fighting and training airplanes from both the British and Canadian governments. New plants and extensions on existing plants were built in the industrialized areas of Ontario and Quebec. A central assembly company was set up by six aircraft manufacturers to take care of specific British orders for bombers. The six companies are making parts, which are shipped to newly-built central assembly plants near industrial centers. Engines for the airplanes are understood to have been shipped to Canada from Great Britain and, according to present plans, some of these ships may be flown to Great Britain from Canada early in 1940.

The first airplane to fly in the British Empire was piloted by J. A. D. McCurdy at Baddeck, Nova Scotia, on February 23, 1909. It was built in Canada by young men under the direction of telephone inventor Dr. Alexander Graham Bell. Despite this outstanding start in the aviation industry Canada did not keep pace, and there was little done in airplane manufacturing until the World War when some of these early Canadian aviators started producing airplanes for the Canadian and British air forces. Near Toronto most of Canada's wartime JN-4 and Avro two-seater fighters were built, at first under private enterprise, later under a government-controlled corporation.

After the Dominion had turned out 2,900 training and fighting ships during the war years, the aviation industry practically stagnated. There was some research by one or two companies on special airplanes for Canada's peculiar flying needs. Flying boats were developed which could land on and take off from

Canada expects to train 10,000 pilots and gunners annually for war duties.

These four men are directing the R.C.A.F. Left to right are Air Commodores W. R. Kenny and L. S. Breadner; Vice Marshal G. M. Croil and Air Commodore E. W. Stedman.

A flying student is instructed in the intricacies of parachutes. Much preliminary training is being conducted at Trenton, Ontario. 'Chutes mostly are American-made.

the many large and small, mapped and unmapped lakes of the northland. Some flying boats were developed for coastal reconnaissance work. But not until 1927 was there much of an aviation industry.

Since then the number of airplane factories has grown annually. These factories received manufacturing rights of British and United States type airplanes for commercial as well as fighting use. Many airplanes were brought into Canada knocked down and assembled at these factories. Engines from both British and United States factories have been assembled at Canadian branch plants. Today Canada has no engine factories, still shipping in parts for assembly, but airplanes are now being produced in their entirety in the Dominion.

Among others Canadian airplane manufacturers have the rights to make in Canada are British Handley Page *Hampden* bombers, Westland *Lysander* scouting planes, Vickers *Stranraer* flying boats, De Havilland trainers, North American NA-16 advanced trainers, Fleet trainers, Grumman fighters, Blackburn *Shark* bombers and—commercially—Fairchild, Boeing, Lockheed, Fleet and *Cub* light airplanes and freighters.

At the outbreak of war the airplane manufacturing industry was just test flying the first of some of the fighting airplanes on which "educational" orders had been placed by both the Canadian and British governments. Since that time the process of turning out these airplanes has been stepped up. Where a year ago it was not expected that mass production of many of these fighting airplanes would be necessary for some time, now airplane plants have started on mass production, although on a much smaller scale than that of the production of United States airplane factories. As deliveries of pre-war orders are completed, more orders from Great Britain and possibly France are expected.

That Canada's airplane industry has been expanding in the past few years is shown in the latest official figures of the industry, issued by the Dominion Bureau of Statistics for 1938. These show that, in 1938, Canada produced at 13 factories 282 airplanes valued at $4,000,000 as against 110 airplanes valued at $1,460,000 from eight factories in 1937. Canada also has increased its aircraft factory personnel and, in 1939, will have increased it considerably over even the record 1938 figure of 1,617 persons with an annual payroll of $2,100,000, which was nearly three times the number of persons employed in 1937. Official figures from the aircraft industry early in 1939 placed the number of men required by the six companies working on the British "educational" bombing airplane order alone at 2,200.

Canada has also been preparing to defend her coasts and send an air force overseas. For the past two years the Royal Canadian Air Force has been expanding. Applications have come from thousands of young Canadians who want to join that arm of the fighting forces. So great has the flood of applications be-

come since the outbreak of war that, within three weeks of the war declaration, the Canadian Defense Ministry had to announce that for a short time, until the air force had waded through the stacks of applications, no more could be accepted. This despite the high educational and physical requirements for recruits to the air force. Here again history repeats itself, for the same eagerness to join the air force was shown by tens of thousands of young Canadians in the last war.

Many of Canada's outstanding pilots of the northland runs have joined as pilots of Canada's growing air force. Some of these have seen service in the previous war, but for most this will be their first war. But they are used to hazardous flying in the northern unmapped bush, where many of Canada's permanent war birds have also done most of their flying, the R. C. A. F. having done much mapping, photography and aerial forest fire scouting since they came back from the last war.

In the past few years Canada has spent annually increasingly larger amounts on its air force. During the early years of the decade, government economy practically eliminated the air force from the annual government appropriations. In recent years the tide has turned and it was felt that Canada needed an air arm for coastal defense. To that end airplanes were bought in Great Britain and training ships were built in Canada. Since the outbreak of war, government expenditures on the air force have increased tremendously. In the first month of the war the government, at least twice to public knowledge, ordered large numbers of training and fighting airplanes to supplement orders already on factory books.

While the air force will be one of the first units, if not *the* first, of Canada's fighting forces to be sent overseas, the air force was called into immediate active service on Great Britain's declaration of war, one week before Canada's war declaration. Permanent units of the air force were shipped from camps in Ontario to the Atlantic coast where they were placed on duty in the three maritime provinces of New Brunswick, Nova Scotia and Prince Edward Island. There, along with units of the small but efficient Canadian navy, they were placed on coastal reconnaissance work. It is understood that a unit was sent to Botwood, the Newfoundland air base for the British trans-Atlantic air service. Canada has taken over the defense of Newfoundland as part of its war duties. On the Pacific coast units of the air force are stationed at all times. Here Royal Canadian Air Force pilots have done much practical coastal reconnaissance work in connection with smuggling and fishery patrol work in peacetime. Here also complete workshops have been set up and at least one commercial airplane manufacturing plant built to make the units of the air force self-supporting because of their distance from the industrialized areas of central Canada. Here also the air force is close to the air industry on the United States Pacific coast.

Blind flying is highly important in modern aerial warfare. The R.C.A.F. student above is receiving advanced "under the hood" instruction in a special trainer.

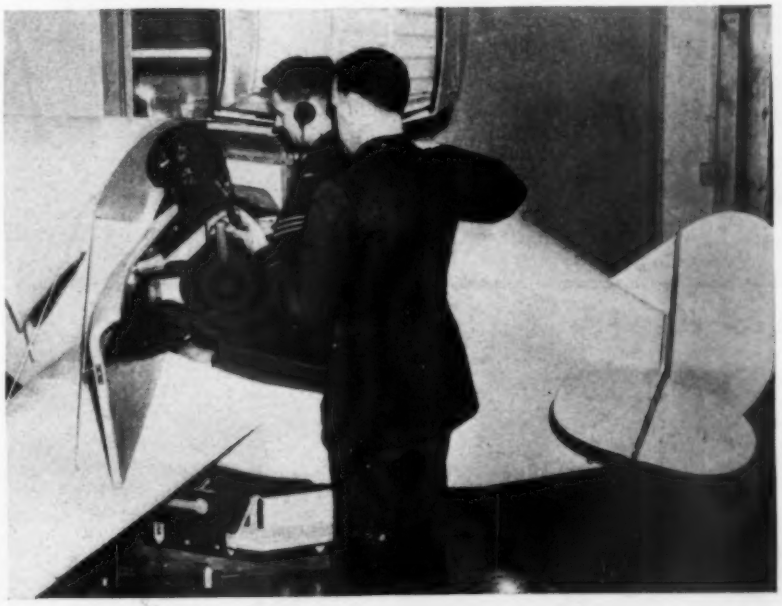
The Polar flights of recent years by Russian airmen have shown the need for defense in the air in the Arctic. Canadian pilots, both air force and commercial, have done most of their flying in that country, have photographically mapped much of that region and are accustomed to flying in the unsettled, bleak, windy region. Patrols of air force planes fly that country regularly each summer, while commercial planes fly it the year round. Now it is expected that all year round patrols of that vast icy region will be made, though winter attacks from that source are not likely Nevertheless, Canada will not leave her Arctic entrance unguarded.

To train Canada's air force training stations are established throughout Canada. Some of the fields have been built during the past five years. At most depots training is available for wheel-equipped, float-equipped airplanes and flying boats.

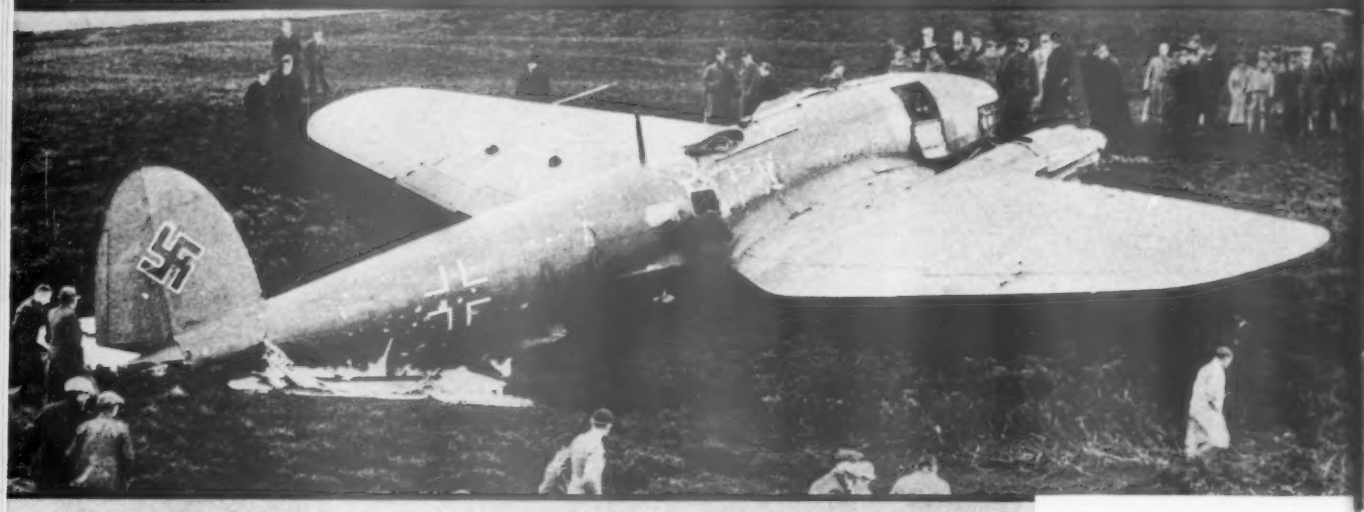
While headquarters of the Royal Canadian Air Force naturally is at Ottawa, the air force has been decentralized with operating headquarters in a number of

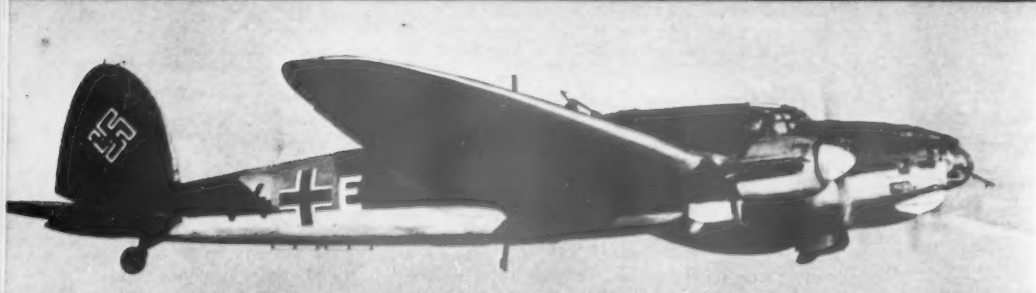
(*Continued on page* 83)

The American Link trainer is playing a vital role in blind-flight training. All preliminary training of this type is given R.C.A.F. students on the Link trainer.



The WAR IN



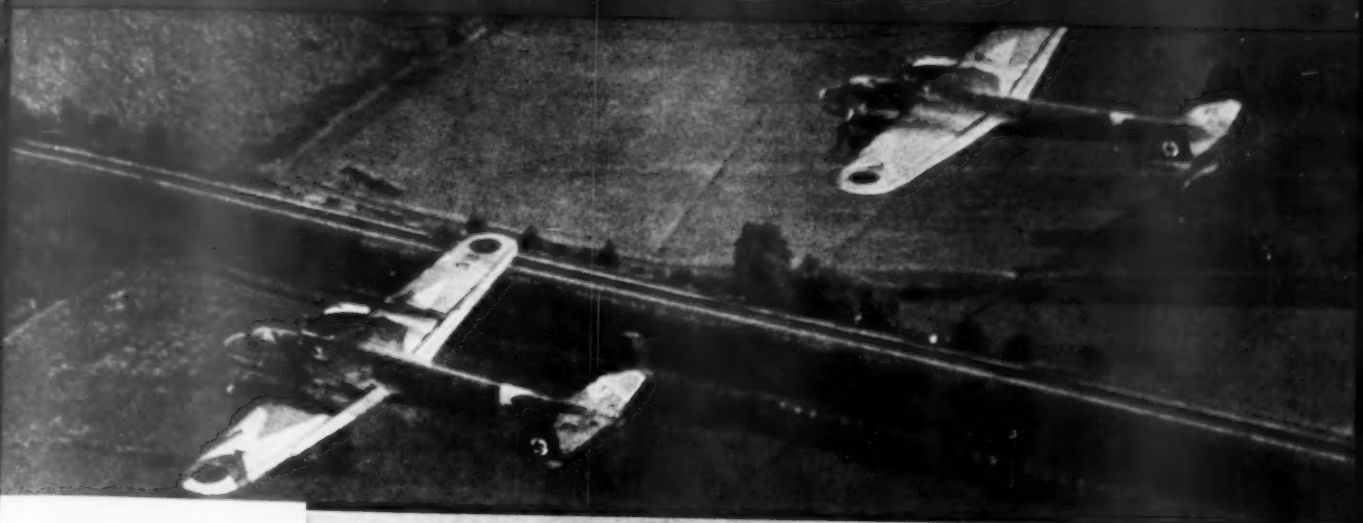


German Heinkel He-111K above was shot down in Scotland. Note bullet holes. Standard He-111K has two 1,070 h.p. motors, crew of four, carries 4,400 lbs. of bombs. Top speed: 261 m.p.h.; cruising 257. Range 1,677 miles. Flight photo (left) shows ship's armament.

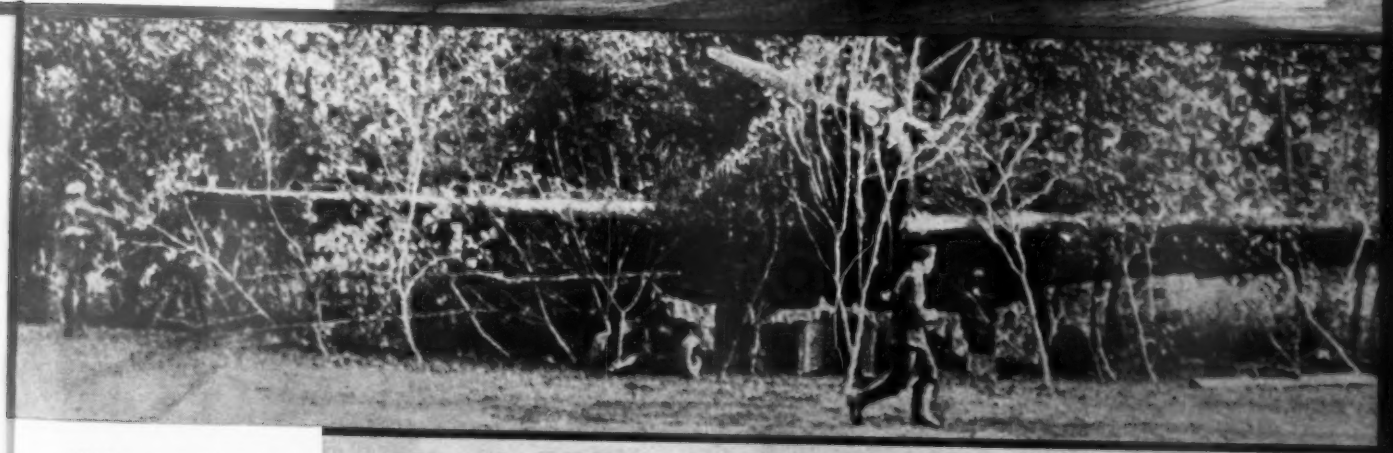
FROM the standpoint of aerial activity, these first months of the war in Europe have been nothing but utter confusion. Almost without exception, U. S. news sources have described air-war happenings with careless inaccuracy. Of course, much of this is due to rigid censorship. What few aviation photographs have reached this country have been barren of any factual description. Hence, the feature presented on these and the following two pages is intended to clarify the few air-war pictures that have come through. It is fairly simple for the editors of POPULAR AVIATION to recognize aircraft types in pictures from the front. By combining that knowledge along with photographs from POPULAR AVIATION'S files showing those ships in clear detail, we have attempted to clarify details found in photographs from the front.

Partly hidden "somewhere in France" is a French Morane-Saulnier "406" fighter (also at left). Armament: one cannon, two machine guns. Top speed 298-310 m.p.h.

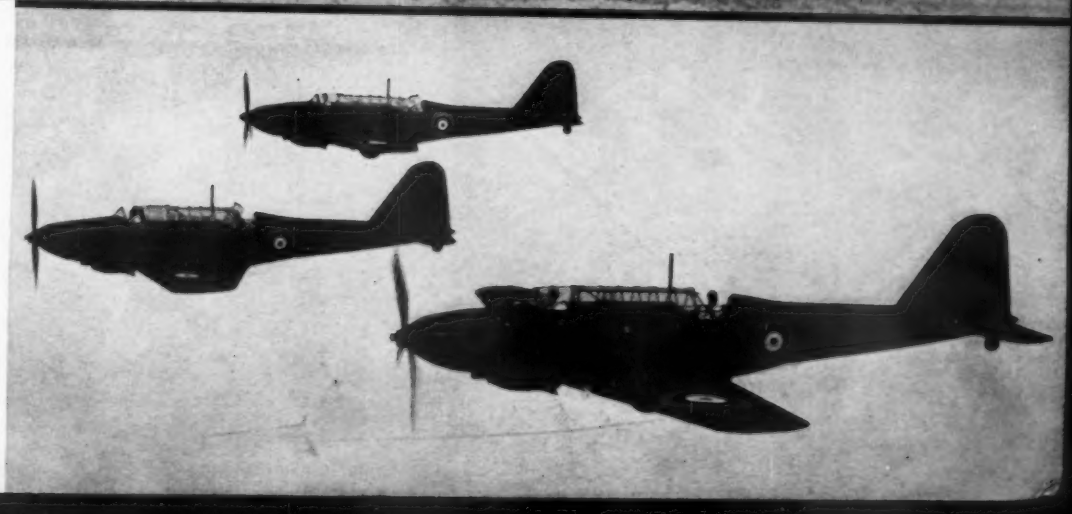
THE AIR



Dornier Do-17 on mission above (also at right) ranks with Heinkel He-111K as staple Nazi bomber. It has two 1,050 h.p. engines. Top speed is 292 m.p.h., cruising 240. With 1,984 lb. bomb load, range is 1,550 miles. Armament consists of three movable machine guns.



Hidden on aerodrome at front is a British Fairey "Battle" (above). In wide use at the front (right), "Battle" is a two-place day bomber with a 990 h.p. motor. Top speed: 257 m.p.h. Range with 1,500 lbs. bombs is 1,000 miles. Armament: two machine guns.



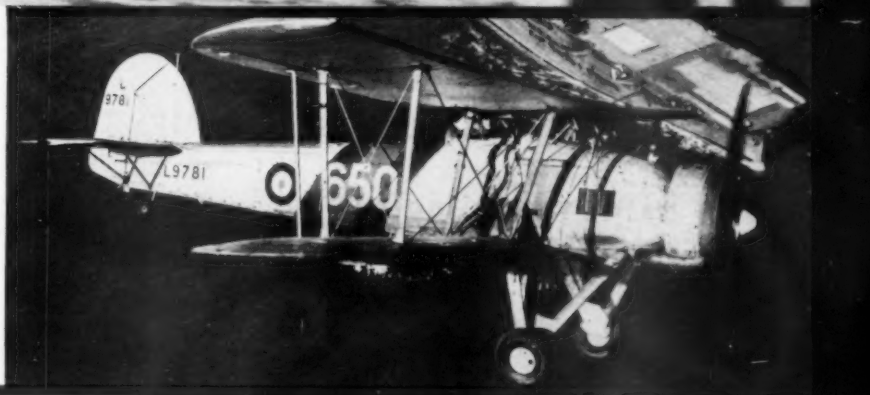
The WAR IN

The French LeO "45" bomber above was shot down by German anti-aircraft. The LeO "45" (also at left) has two 1,100 h.p. engines, crew of four, three machine guns. Top speed: 300 m.p.h. Range with full load is 1,600 miles.

British Bristol "Blenheims" (below) were shot down during raid on Nazi naval base. "Blenheim" is staple twin-engined bomber, has two 840 h.p. engines, two guns. Top speed: 279 m.p.h. Normal range: 1,000 miles.

THE AIR

Plane attacking Nazi submarine (above) is a Fairey "Swordfish" (also at right). Picture was taken from an American ship which rescued crew of British steamer torpedoed by U-boat. "Swordfish" carries torpedo or bombs, crew of three and is powered with a 690 h.p. engine. Top speed is 154 m.p.h., cruising 131. Useful load is 1,900 lbs. Range is 746 miles. Armament: two guns. The "Swordfish" is staple Naval patrol ship.



Above is most famous German fighter, the Messerschmitt Me-109. At right is an Me-109 shot down by French. Standard Messerschmitt has 1,150 h.p. engine, top speed of 354 m.p.h., cruises at 298 for range of 621 miles. Armament is two machine guns and one 23 mm. cannon.

Not so well known as Messerschmitt but widely used by Nazis is the Heinkel He-112 (squadron below, close-up at right). He-112 has 1,070 h.p. engine, top speed of 350 m.p.h., two machine guns and two cannon. Experimental version, called He-112U, flew 464 m.p.h. Like most Allied and Nazi warplanes, Heinkels use American-designed propellers.

This is the advertising-splattered "Cub" flown to a new record by the authors.

By

KELVIN BAXTER

and

ROBERT McDANIELS

Two young Indiana pilots tell the story of their 22½ day flight to a new lightplane mark

ENDURANCE flying is just plain hell. You torture yourself to make new records. We now, because we've just finished a continuous flight of 34,828 miles at an average speed of 65 m.p.h. Do you know how long it takes to do that? We do. We were in the air for 535 hours and 49 minutes. That's just over 22½ days. Frankly it was plenty long enough for either of us.

We started our flight last October 1, with the intention of setting a new endurance flight record for lightplanes—and that's just what we accomplished. The old lightplane mark was 343 hours and 46 minutes and was made last August by the Moody brothers, Hunter and Humphrey, at Springfield, Ill. We passed their mark by 192 hours and 3 minutes.

Let us say right here that our record is not affected by the magnificent flight of Wes Carroll and Clyde Schlieper in California. Those boys used a seaplane while ours was a landplane. Their flight of 726 hours is the absolute world's endurance record right now. The old absolute record was Fred and Al Key's 653 hour flight made in 1935. Carroll and Schlieper did a wonderful job. We don't suppose anyone else in the whole world can appreciate that as well as we two. All honor to them. They know what hell endurance flying can be as well as we do. We'd like to talk over our flight and their flight with them some one of these days.

We'll be glad to tell you all about our own flight but don't ask us that question: "Why are endurance flights?" That's always a little embarrassing. Of course they do prove things about airplane engines—reliability—and they do test the toughness of lubricating oils. Maybe on those grounds alone, they are worth while.

But for us—we made our flight because we wanted to earn enough money to continue in aviation. We wanted it quickly. One of us (McDaniels) wants to pay for instruction he'll need in order to get his instrument flying rating so he can apply for an airplane pilot's job. The other (Baxter, of course) wants to get his commercial license and funds to pay for several of the airplanes he owns.

(McDaniels now talking.) Baxter and myself began planning our flight about the time we became partners at the Richmond, Ind., airport last winter. We had a Hisso Travel Air and a Waco "F," and we bought ourselves the J-3 *Cub* trainer we used in the flight. We

Here are the authors a few seconds after landing. They were unable to stand unaided.

A can of fuel is hooked, pulled up into the ship and immediately put in the tanks.

Non-Stop to Nowhere

had purchased that airplane with the intention of using it for an endurance flight and we specified a Franklin motor although we had to wait a while longer to get one.

At that time the record was 218 hours and was held by somebody in the west. We figured we certainly could beat that. But Richmond field was unlighted and we began scouting around for an airport with lights that would be willing to take the flight. Eventually we came to Muncie through the good offices of Clyde Schockley, the airport manager; and of Lee Eichenberry, co-manager and *Cub* distributor for the entire state of Indiana.

K owned the airplane (the two boys call each other "A" and "K." K, of course is Kelvin. A is McDaniel's middle initial) and we made some changes as you can imagine, to get it ready for the flight. We got our waivers from the Civil Aeronautics Authority, had the ship all torn down, our bed arranged and had the plane in such condition that it had an X license. That meant that we couldn't use it for commercial work.

Just at that moment the Moody brothers got past the old 218 hour record and went merrily on. We stood around with our fingers crossed, you can bet. Not that we wished them any bad luck, but we kept seeing the record at which we were shooting getting harder and harder to beat every hour. We didn't postpone our own plans but it was hard to take.

Meantime we'd run out of money getting the plane and engine, and instruments installed and set. We had to have someone buy the gas.

Our savior was Harry Singer, Muncie's leading baker. He's always been an advertising live wire and after he heard our story he agreed to buy the gas. We named the *Cub* "Miss Sun Tan" after Harry's bread. He'd never been in an airplane at the time we began the flight, but he's been up now and is a good prospect to buy a ship in the near future.

The Kendall oil company gave us our oil. The stipulation was that they should get a couple quarts of whatever was left in our crankcase after the flight was over. They wanted to test it in their laboratories, because they knew we had made no arrangements for changing oil but planned to keep it clean and add oil when it was needed. They figured, as we did, that this would be a real test of their product.

(Baxter now talking.) I suppose you all know we made two flights. Yeah. We found out how not to make flights the first time. It lasted 183 hours or so and ended with an intake valve stuck slightly open. We made a forced landing at the Knightstown, Ind., emergency field and started over. We were really licked by the hot weather. We started on a fairly cool day but ran into a bad hot spell. Outside air temperature ran as high as 106° and oil in the engine 210°. It was awful.

Never did have to repair that valve. When we got out of bed—first thing we did was to hit the hay—we found that the Franklin engine company was sending us a brand new motor off the production line in exchange for the old one. It was a straight production job. They only ran it in for a few hours longer than they do most of their engines.

Here's what we took off the ship in preparation for our second start: radio receiver—it didn't work well and we didn't need it—and our cast iron belly fuel tank, which weighed 63 pounds empty. We put on two nine gallon *Cub Coupe* tanks, making a sort of torpedo that was streamlined beautifully by Clark Norman; an exhaust silencer designed and installed by McKinley Leapley, chief mechanic at Muncie airport and a former classmate at Brooks field of Col. Charles A. Lindbergh. Leapley also tuned our motor and adjusted our carburetor just before we got off—all extremely important items.

Clyde Havens, one of the regular

The authors (McDaniels, left; Baxter, right), just before their take-off. Their ship was a standard "Cub" with a Franklin engine. Note muffler pipes below engine.

pilots here, fixed us up an oil level indicator—a float level—that was accurate almost to the ounce. And maybe you think it wasn't important to keep oil in that engine. Our oil filter was a de luxe automobile filter. Leapley fixed up lines so we could by-pass the filter or use it at will. We generally filtered it a couple times daily.

Our plugs were Champion J-10s—for automobile trucks. We set the gap for .016 at the start knowing they'd burn away as we progressed. The gap was supposed to be .025 so you see we left ourselves a comfortable margin. We had no plug truble at all. On the wings were wind-driven generators and wind-driven fuel pump. Both were within reach and could be taken off the brackets and repaired during flight. We had both off for repairs during the flight. We had two other pumps. One a hand wobble, one an engine-driven AC pump. Leapley had the lines and cocks arranged so we could pump; 1) from refueling can to belly tank; 2) from can to front tank; 3) from belly to front tank We needed all three pumps.

We had a plywood shelf back of the seats. That was bed. We had some pillows and blankets there. You could sleep—and we did. We could shift around (we worked it out on the ground) and move from either seat to bed. We flew only from the front seat and threw out the rear stick the second day we were up.

(McDaniels back at the controls.) We've got to tell you right here about our ground crew. Those boys had just about as tough a time as we did. They made nearly 1,700 contacts with us, driving a light truck across the airport at 60 m.p.h.—sometimes out into the soy bean patches—to hook fuel, food, oil and whatnot to a rope we dangled from *Sun Tan*. Our ground chief was Earl "Red" Luker. He drove the truck for all but one of those contacts. Red didn't average four hours sleep in 24 for the whole time we were up. He didn't get cantankerous and he proved himself a wonderful driver. I want to tell you about that.

The refueling crews used a standard delivery truck. Hardest job was for truck's driver, who had to follow plane.

Red had two teams of hooker-oners. One team was Leland Dean and Gerald Baker. The other was Dick Seebree and Charles Baker. These boys, two at a time, stood in the rear of the truck. One would grab the weighted line as we came over the truck and hand it forward to his pal who would snap the bail of the cans we used to the spring-closed hook on the rope.

It was all done in a matter of a second or two. Those boys got so good at it that toward the end we would only fail to hook our cans in one out of 100 attempts. Tell you the truth we couldn't tell which of the teams was the best, either. The only way we'd know which one was at work was by getting a look at the boys' faces when we went over them. We could always do that because we'd be less than 20 feet over the truck.

Our system was simple but it demanded real teamwork. The truck we used had a cab on it. Red had to lean way out the door and look back over his shoulder to see the airplane. He couldn't look ahead. That made it tough. We finally figured that the pilot would fly the *Cub* down low and hold the airplane in a straightcourse across the field. The truck driver, guided himself by driving under the plane and kept the truck headed along the plane's path. Don't think that didn't take some real trust between the driver and the pilot. Flying the plane was the easiest part of that, although the truck was out of sight of the pilot for a few seconds as we passed over it.

(Baxter takes over again.) Boy, I'll tell you how desperate we were when we finally got off that second time. We had exactly 28 cents between us and not a single promise of even a dollar from anybody on the ground. We were gambling everything on the flight. I owed money on all three of my planes and McDaniels had spent all his cash too. Talk about rugged individualism. We were damned rugged and were all set to be ragged if we didn't click.

The first couple of days in the air neither of us slept. We tried but just weren't able. We'd make refueling contacts about five times in 24 hours and would eat almost every time we took aboard gas or oil.

Really we didn't need to refuel that often. We could carry 18 gallons in the belly, 12 in the front tank and five two-gallon cans of gas just behind the rear seat, under the bed. That gave us 40 gallons aboard or enough for 10 hours cruising. But we never intentionally let ourselves get lower than nine or 10 gallons—about 2½ hour reserve.

After the first excitement wears off, though, it's awfully hard to stay awake. Especially at night. We both went to sleep and left the ship flying itself a thousand times. Here's how it would go: The other boy would be asleep and it would get to be black in Muncie, only a few street lights showing. You'd sit there thinking about something—it seems you can think awfully well up there on a quiet night. Pretty soon you'd lean your head against the side and your flying and your thoughts would get all mixed up together and we'd doze right off.

For a long time the ship would go right on flying. Gradually though one wing would go down—and not always the left either. That *Cub* of ours was perfectly balanced and the fin set exactly to offset torque at cruising. We could fly it indefinitely on either con-

(*Continued on page 78*)

LATIN LANDPLANES

Latest addition to the Cuban air force is this quartet of Stearman trainers.

AIRMAIL FOR PUNKIN' CENTER

By JENNINGS RANDOLPH*

An AAA clerk loads mail into a special plane pickup sack.

AIRMAIL for the backwoods communities. For the crossroads hamlets. For the little back-water villages and towns. For all the 90,000,000 persons in the United States who live away from the main airways and whose mail service today is comparable only to that given the country in Civil War days.

Imagine a rural free delivery of the air. Airmail service that does not pass over and ignore the little homesteads of 400 to 500 persons. That instead blankets the entire nation with routes that will give these little towns an airmail service just as efficient and virtually as frequent as now is rendered to the country's largest metropoli such as New York, Chicago, Kansas City, San Francisco and others.

If you can see this picture you realize that such an R. F. D. of the air promises

*Congressman from West Virginia.

Sign in store window at left advertises fresh fish received via Tri-State. Below, the author (left) helps load a plane.

to bring about the most far-reaching development that commercial aviation has seen since it first became a reality. And this kind of service is not a wild dream. Instead it may be put into operation by the United States Postoffice within a matter of months. For the postal officials have watched the development of just such a service during the past year in Pennsylvania and West Virginia. A service that requires few airports, no large investments of public or private funds to create, yet has shown in actual demonstrations of regular, all-weather flying that it is practical and economical.

I am referring to the airmail contract held by All American Aviation, Inc., that now is serving 58 communities on two airmail routes—one between Philadelphia and Pittsburgh and the other between Pittsburgh, Huntington and Charleston, W. Va. Over these routes some 1,540 miles are flown daily and airmail and air express is brought to communities ranging from a mere 799 inhabitants to larger cities of 105,000 persons.

The major airline operators flying large airplanes can only link up the big cities. And they can provide service only where expensive airports of large area with hard-surfaced runways, landing lights, radio range facilities and other costly aids to navigation are present,

But AAA (All American Aviation) gets along without most of these aids. The greater majority of the communities where the Triple A brings its mail and express service possess no suitable landing fields, there are no radio range beacons over its routes and no beacon lights for night flying. There are, however, even more startling differences, to wit:

1. The major airlines that carry passengers, mail and express plan their routes so they serve communities that are from 150 to 250 miles apart as a maximum and at times the distances are 700 miles—as between Chicago and New York. Triple A's communities average 17.5 miles apart. Between some pickup stations the distance is as small as five miles.

2. The major airlines find it uneconomical to make landings more often than once each hour to hour and a half. Triple A makes its contacts with the communities at intervals of five to 22 minutes.

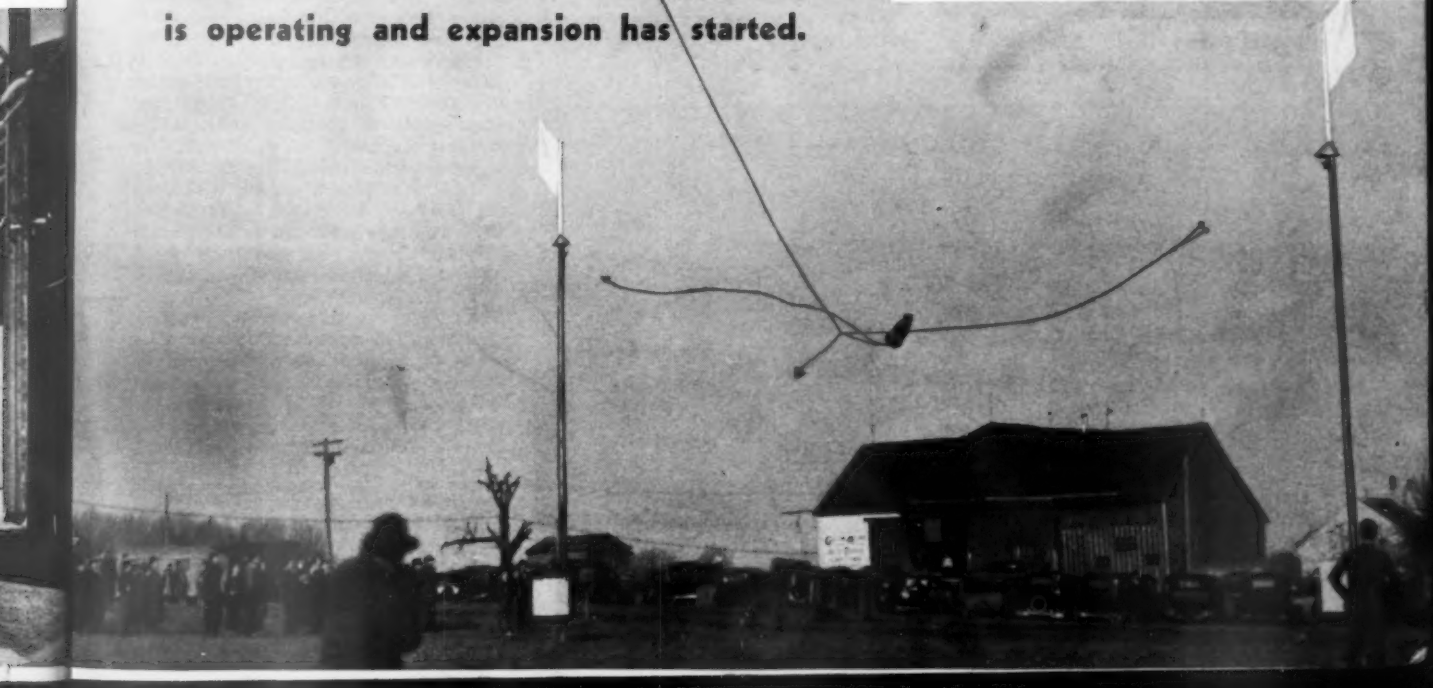
3. The major airlines say that their schedules, calling for 155 m.p.h. block to block, could not be made if they served small places at frequent intervals. But AAA maintains a scheduled speed of 110 m.p.h., yet never cruises its ships at air speeds faster than 140 m.p h.

In fact, All American operates profitably and efficiently in joining towns into an airline that would be commercially worthless to any other airline operator in the world. The secret of course is that, while serving many of these little communities, the Triple A planes never stop. They drop incoming mail and express and pick up outgoing bags and parcels while in flight. The communities that have no airports are equipped with pickup stations on farms, in public parks, on hilltops and mountain peaks. There even is one station at the edge of a cemetery and another on an island. Pilots dropping mail on the latter must make each "delivery" with precision and care, for if the mail bags are dropped short they fall into one stream and if they overshoot they fall into another.

If landings were made they would slow up the service to such a degree that its value as the fastest means of transportation would be lost. And furthermore, by using the aerial pickup and delivery system, the Triple A includes in its routes communities where it never will be possible to land a conventional type landplane.

Now consider the picture presented by a really wide application of the Triple A pickup airmail system. There are 4,000 cities in the United States with populations of 5,000 or more. Today only 210

Every community in the land now can have daily air service. Far from mere prediction, the basic system already is operating and expansion has started.



Dr. Adams' pickup system enables planes to scoop up mail in flight at 100 m.p.h.

Connections with the regular airliners are made by AAA's pickup mail planes. Above, an AAA Stinson has brought the mail in from small Pennsylvania towns for transfer to an airliner at Pittsburgh.

Richard DuPont, famed gliding enthusiast, heads All American Aviation as president.

of these 4,000 cities (excluding those served now by Triple A) have direct mail service over established routes. The great air transport companies are comparable to a railroad system that operates nothing but through service over major trunk lines.

There are 900 cities among those that do not now receive regular airmail service with airports already constructed. And it would be only a matter of months before all the other communities that do not have airports could construct the special airmail pickup stations that are required for the Triple A system of pickup. It took 20 years to give service to 210 cities but only months to spread it to the full 4,000. Indeed, it would not be necessary to restrict this service to towns of more than 5,000. Every community that cared to put up a pickup station could have airmail service.

All this would not be possible were it not for a surgeon who was bitten by the aeronautical bug some 30 years ago in California when he was flying with the late Glenn Curtiss in California. He is Dr. Lytle S. Adams. He first conceived the aerial pickup during the period when Curtiss was flying at San Diego, but for years thereafter he was unable to make the tests that brought it to perfection

About 1924 Dr. Adams began spending his own money on experiments. In 1927 he had his first full-sized working model which he demonstrated successfully before officials in Washington and with service between the Leviathan and New York city in the first ship to shore mail. Dr. Adams had arranged for financing and believed that his system would inaugurate the RFD of the airmail at that time, but the market collapse of 1929 sank his dream.

The setback, however, was only temporary. He abandoned his highly successful practice of oral surgery to devote full time to promoting his device. He demonstrated the system for the post office in Washington again and also at the World's Fair in Chicago in 1933, but was unable to get any contracts for carrying the mail.

Somewhat discouraged, he came to my office in Washington in 1935, with a letter from W. P. Wilson of Wheeling, W. Va, board chairman of the Fokker Airplane Corporation, who knew of my interest in expanding our airmail system. Adams told me the story of his struggle and gave me another one of his demonstrations. I became interested, read his material, and suddenly the implications of the thing caught my imagination.

At that time we had less than 200 cities receiving airmail yet there are about 15,000 first-, second- and third-

This is an early experimental pickup from the after deck of the "Leviathan."

Another early demonstration of Dr. Adams' pickup device was made at the Chicago World's Fair of 1933.

An ideal adjunct to All American's mail pickup system is Tri-State, its sister company. Tri-State specializes in express loads (above.)

class post offices in the country and 30,000 fourth-class offices. I could see no reason why most of these—in the future—might not have airmail. Many of my colleagues shared my enthusiasm, but it was not until 1938 that Congress took up the question of authorizing the Post Office Department to initiate experimental feeder service, as well as experimental autogiro service between outlying airports and centrally located post offices. In April, 1938, Congress authorized the experiments.

So far so good. But these authorizations did not provide funds. I therefore introduced an amendment to the regular post office appropriations bill which authorized the expenditure of $100,000 on these experimental services. It passed and the department soon afterward laid out the routes and called for bids.

Let me break the continuity of the story right here to explain just how Dr. Adams' pickup device operates. The device, fully automatic, makes it possible for an airplane pilot to drop one bag of mail as he approaches an airport and pick up another bag while continuing to fly at speeds of from 90 to 125 m.p.h. Special equipment on the ground and in the airplane is necessary.

The ground equipment is simple in construction and operation. Two steel poles each 36 feet high are set into concrete blocks 60 feet apart. A line connects the poles and the mail bag to be picked up is fastened to the center, held in a special plywood container.

Virtually any type of airplane can be used. Triple A use five Stinson *Reliants* with 330 h.p. Wright engines. The only seat in these ships is the pilot's, the rest

(*Continued on page* 60)

These are All American's present pickup routes; 58 towns are being serviced.

Dr. Adams is pointing to the shock absorber on an AAA plane's pickup device.

Paul Kollsman (insert) heads his own prospering company which he built up from a tiny shop to the sizeable factory above.

HOUSE OF THE FLYING SAPPHIRES

by SPENCER GREGG

This is the story of Paul Kollsman and his almost fanatical craving for the perfect aircraft instrument. It is the story of a shy engineer whose name is famous.

Latest Kollsman instrument is this unusual panel-mounted direction indicator.

LET this be the story of the flying sapphires—and, in the telling, the history of a man who must have escaped from between the covers of an Horatio Alger book.

Paul Kollsman is the last person in aviation who would want that shiner hung on him and, in truth, as an Alger character he shall be said to fall down badly on the qualities of sweetness and light. But his success story, based on an almost fantastic zeal for perfection in instrument making, contains all the nuances of one of those do-or-die yarns that fathers like to give to their boys at Yuletide.

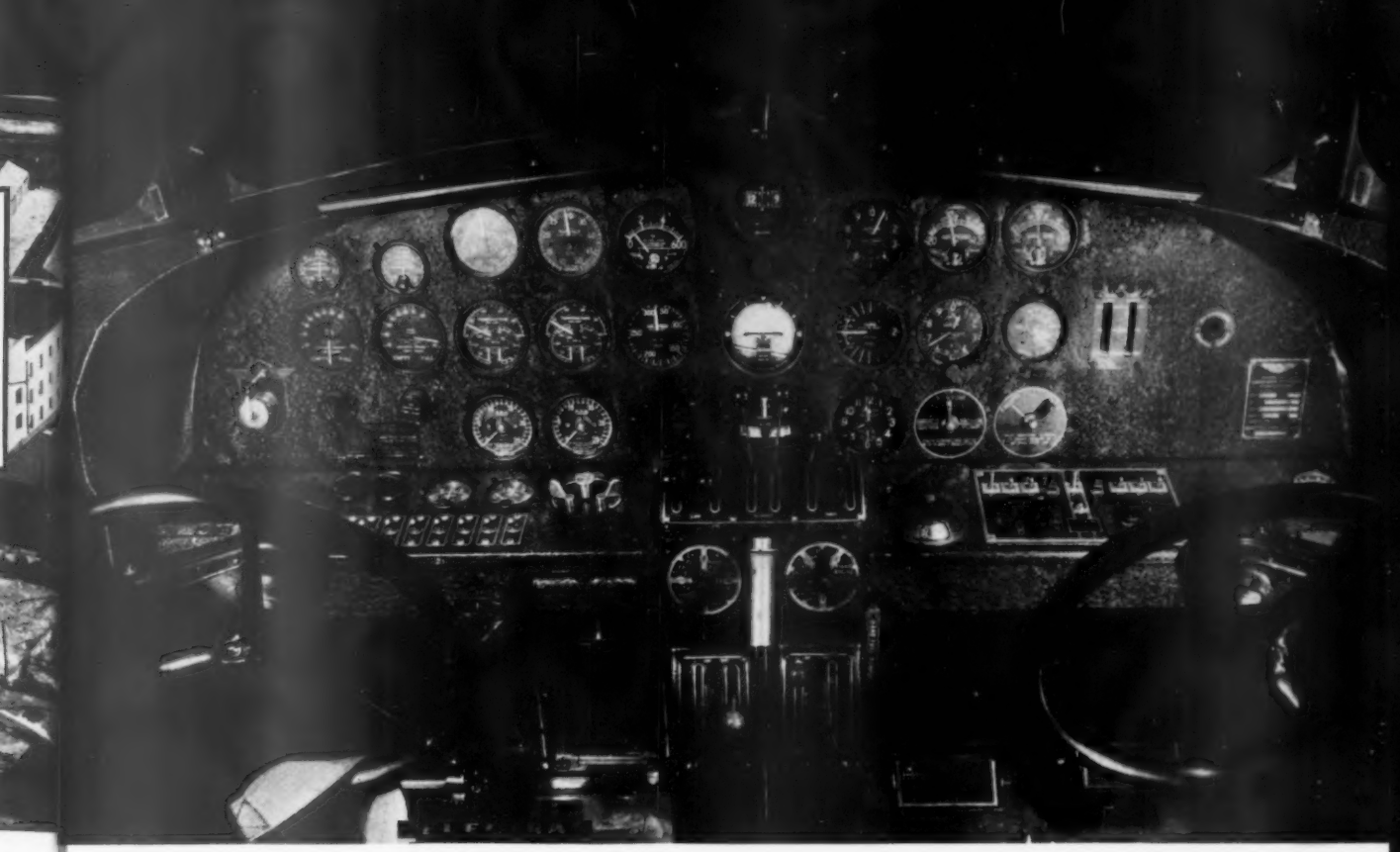
Mounted in the instrument panels of practically all the airliners operating in the United States, and in those of many which fly abroad, are precious stones which bear the stamp of Kollsman workmanship. Those sapphires are bearings, cupping the axles of tiny gears which tell a pilot where he is going, at what altitude he is flying and how his engines are behaving.

Paul Kollsman's sole purpose in aviation is the attainment of precision. In working for accuracy he has the passion and technique of a virtuoso. Thousands of airmen, at the controls of both commercial transports and private ships, streaking along in weather that drives calico range ponies to shelter, "retire to the library" to consult sapphire-set Kollsman instruments. Ever hear a radio airway report, "Kollsman 29.95"? That's the barometic pressure reading on which a pilot sets his Kollsman altimeter.

A strange fellow, this Kollsman. When he gets in the throes of an idea, he may not go to his desk in weeks. Instead, he threads his way through lathes, work benches and piles of manufacturing supplies to the laboratory of his plant, not far from the towering spires of Manhattan Island and there he will sweat until he has solved his problem.

He draws on an uncanny well of persistence. If he is indisposed and remains in his apartment for a few days, his engineering staff sighs and prepares for a deluge of fresh work. The 39-year-old Kollsman is certain to return to the factory carrying reams of paper covered with notes. If a man is sick, he can't just lie there, can he?

Sensitive altimeters, climb indicators, "Telegon" remote control indicators, electric tachometers, direction indicators —some 70 different instruments of 22 types represent the output of the Kollsman Instrument Company, Inc., as a



Kollsman instruments now share the instrument panel of the modern airliner with Pioneer and Weston, both veterans.

one-time truck driver's contribution to safer flying.

That goes back a few years.

It was in 1923 that Paul Kollsman, educated at the German universities of Munich and Stuttgart, sat down with himself to consider his future. Germany was in the midst of an attempt at post-war economic rehabilitation which wasn't helped much by what the bankers know as cheap money. Engineering ideas were going begging. A brother, Otto, already had gone to America. Well, why not? It was pretty tough sledding over here. He not only drove a truck. He also worked as a garage mechanic. Presently he took a job with an instrument company. Paul Kollsman was a willing toiler but some of his superiors thought he was a crackpot. Good altimeters were being made, weren't they? And as for making one as sensitive as Kollsman proposed, well, he must be "hitting the pipe."

By 1928 Kollsman was launched as a one-man firm. His laboratory was in an attic. His tools were a second-hand lathe, a small drill press and a vacuum pump. As president, general manager, treasurer, workman and night watchman, Kollsman had to double in brass, but he did produce his sensitive altimeter.

(Today, only eleven years later, he employs 300 men and women; in his experimental laboratory alone, more than two dozen men report for duty every morning.)

That altimeter's accuracy was amazing. The Navy Department began placing orders. The fact was that the first Kollsman altimeter actually was not the "sensitive" altimeter to come. Inside of another year he had developed a second one—used by Jimmy Doolittle in the instrument landing experiments underwritten by the Guggenheim Fund.

Kollsman was tireless in traveling back and forth between his shop in Brooklyn, N. Y., and Mitchel Field, the Army post in the wide open spaces of Long Island. He would install his instrument in Doolittle's ship, wait for a report on its performance, then tote it back to his tiny laboratory to tear it down and study it anew.

The sensitive altimeter still is the backbone of the company's production. The secret of its construction is a superlative aneroid unit, an evacuated box which expands and contracts with changes in atmospheric pressure, and an almost frictionless gear transmission which actuates the needle telling a pilot his height above sea level. Properly calibrated, it reads true within five feet.

"Take any instrument in the shop," a Kollsman official invited a representative of POPULAR AVIATION, "and carry it from the second floor here downstairs to the first floor. You will be able to read the difference in the Kollsman altimeter."

He wasn't fibbing.

Like a good many other Kollsman instruments, altimeter pinions are set in sapphires. Gears are precision-cut. Compared with Kollsman gears, those in a high-priced pocket watch are the work of an amateur. In fact, a whole row of jeweler's lathes, designed for supersensitive work, can be found in one corner of the factory.

Sales to the Army and Navy, supplemented by some to other interests, grew. Kollsman expanded. By 1932, he had 19 names on his payroll. He had opened a new shop but it was subject to expansion overnight. By 1938 the girth of Kollsman, Inc., was busting the buttons on its attire so often that the head of the firm had to move, bag and baggage, to a plant across Long Island in Elmhurst. He hopes its 70,000 square feet of floor space will hold his project for awhile.

The Kollsman concern is a one-man organization in that its founder owns it, lock, stock and barrel. In New York's marts of trade, Kollsman stock is conspicuous by its absence. The head of the company plays them close to his chest. What the establishment, with its old-maidishly prim facade on a quiet street in New York's Borough of Queens, is worth is Paul Kollsman's own business. The one-time truck-driver, who never mentions those hard, early struggles in the United States, re-capitalized his busi-

Staple Kollsman instrument is the sensitive altimeter, now in widespread use.

This was a Kollsman display at a recent show. Nine standard models are shown.

ness in 1937 at $800,000. That is not a fancy figure in big business, but eleven short years do not constitute an age, either.

Instrument manufacturers generally turn over their total capitalization about one and a half times in the course of a year. On that basis, Kollsman's annual gross would be about $1,200,000. In 1938 the gross on all instrument manufacturing in this country ran in excess of $7,000,000, and probably was closer to $8,000,000. As between Pioneer and Kollsman, the two concerns engaged exclusively in the manufacture of aircraft instruments an independent source estimated a year ago that Kollsman enjoyed some 60 per cent of the total business logged on the books of both. The remainder of the instrument and parts business in this country is divided among four or five other companies which do not confine themselves to instrument making alone.

A lover of peace, Paul Kollsman shies perceptibly from the thought that things of his manufacture are being used in the military planes aloft in Europe today. Kollsman instruments regularly are exported to Great Britain, Belgium, the Netherlands and Sweden in what was termed "large quantities." In addition, plants in Japan, Britain, Switzerland and Germany manufacture certain items under license.

There have been plenty of headaches. The direction indicator, for instance. That practically brand-new Kollsman product, flown by Howard Hughes around the world in July, 1938, kept not only the head of the company but a good many of his engineers awake at night.

Anyone who has ever been in the cockpit of an airplane has watched the old-fashioned card compass whirl on a turn. Until the ship gets straightened out, east is south and west is north.

"Can't be done," said the wiseacres when Kollsman proposed designing a compass which would "stick with the ship." Curiously enough, Kollsman encountered skepticism even in his own plant. The results of his work were best described by Hughes' reaction to the gadget. Relieved of the compass, an experimental job far from ready for production, on his return from his record-cracking 91-hour stint around the globe, Hughes flew his Lockheed back to the west coast.

"Send direction indicator or one identical with it," was the substance of the wire he sent to Kollsman within a week.

The secret of the compass is using the piffling little force in the magnetic element to drive gears which provide the exact heading of a plane during every instant of a turn. Again, precision manufacture enabled Kollsman to reduce friction almost to the vanishing point and do something which couldn't be done.

Kollsman's outstanding contribution to the science of flying, apart from his precision instruments, is ripping a lot of the "plumbing" out of the engines, wings and fuselages of transport planes.

Gone are many of the pipes leading to the instrument panel. Manifold pressures, for instance, are transmitted electrically to dials on the panel.

"Why the plumbing?" asked Kollsman in effect. "Why not pick up the reading at the manifold and telegraph it to the pilot?" He did it with a tiny mechanism which, attached to the hand on the face of a gauge at the manifold, accurately registers and transmits by wire to a small, compact dial the power output of those motors many feet away from the man at the control wheel.

Kollsman ingenuity produced the electric tachometer. It consists of a generator on the engine and a synchronous motor which drives a magnetic tachometer. Voltage errors due to temperature can be ignored.

A hint of things to come lie in guarded remarks dropped around the factory on the need for more accurate altitude control and even better direction indicators.

Kollsman has surrounded himself with an extraordinary combination of specialists, among them Victor E. Carbonara, plant manager. Carbonara was a navigation officer in the Italian navy during the 1914-1918 war. Described as one of the world's most versatile men, he numbers among his navigation pupils some of the names which have made headlines. Brock and Schlee, Laura Ingalls and Shorty Cramer took lessons from him.

He is credited with the development of the "Telegon," or the remote indicating system which does away with cumbersome plumbing, for Kollsman. He is a specialist not only in electrical but optical devices as well. He developed a new method of making instrument dials by photography. He designed an octant which is the standard navigating instrument of its type in the United States. In the basement of Carbonara's home in Rockville Center, a tiny community on the south shore of Long Island, is a complete machine shop and laboratory. He is building two telescopes there—and grinding his own mirrors.

Another of Kollsman's executives is Charles H. Colvin, general manager. In aviation for longer than he cares to remember, at one time—in 1913, to

(*Continued on page 87*)

Two Kollsman veterans are Walter Angst (left) and Victor Carbonara. The later is credited with developing the latest Kollsman project, a remote indicating system.

Is Amelia Earhart Still Alive?

by Dean S. Jennings

Editor's Note: This is the second and concluding part of Mr. Jennings' unusual article. Last month's installment described and pictured many of the weird letters and telegrams received by George Palmer Putnam, Miss Earhart's husband. Yet Mrs. Earhart, AE's mother, insists her daughter still lives.

Just before starting on her last flight, Miss Earhart posed on her ship's stabilizer.

GEORGE PUTNAM returned to California—and the stream of letters still flowed. But the edge of curiosity was dulled, he had not quite the same zest for searching the unknown. Yet there were some whose challenge he could not resist. And occasionally there were results which, though inexplicable, clearly showed how much the world has yet to learn about psychic phenomena, mental telepathy and related fields. One of these experiences concerned Mr. Ka, a Los Angeles crystal gazer. Accompanied by his son, David, and a stenographer, Mr. Putnam attended a demonstration in which Mr. Ka went into a trance over a huge crystal ball.

After a moment of silence, he began reciting letters rapidly in a hollow, muffled tone. He rattled them off for seven minutes and, when typed, they proved to be rambling sentences in *Latin*. Subsequently, when the message was translated, it contained an astonishing amount of little-known information about Amelia Earhart's flight and gave the location of the lost plane.

A search of the remote area described was out of the question. And later, when Mr. Putnam called on the clairvoyant again, he was given another message which said, simply: "You are too late."

George Putnam was convinced the whole performance was faked, until a confidential investigation disclosed that Mr. Ka was totally uneducated, spoke and wrote very poor English—and had never before given out a message in Latin.

Late in September Mr. Putnam received a telephone call from a man of unquestioned integrity, a writer long prominent in literary circles and a serious student of psychic phenomena.

"George," he said eagerly, "I have had the most baffling experience in all the years I've been doing psychic research!"

"Well . . ." Mr. Putnam said lightly, "what am I supposed to do?"

"Now, listen. This medium is a middle-aged woman of considerable intelligence. She has two voices—one her own, and another that comes from some place in her chest."

"Ventriloquism, perhaps?"

"No—I've already eliminated that possibility. The point is, George, she gave me a brief message from AE the other night."

"Oh . . ."

"And there may be more. I just thought you'd like to sit in for a demonstration."

"Of course."

"All right. Make it tomorrow night, about 7:30?"

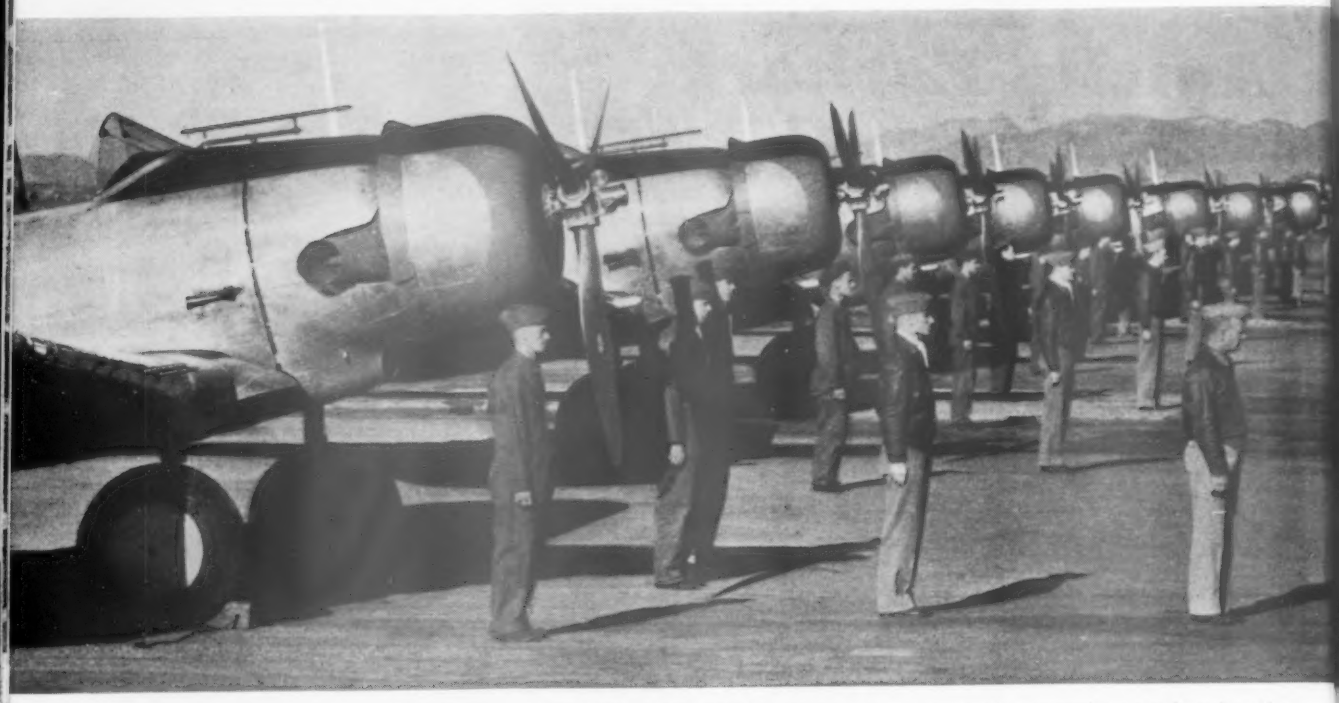
"Fine. I'll be there."

And so George Putnam, still skeptical, still rebuking himself for toying with fantasy, went to the author's Los Angeles home and witnessed a phenomenon that numerous observers have yet to solve. The woman medium was thoroughly examined before the demonstration began. Her mouth was taped, Mr. Putnam and his friends stood very close to her and all the lights were on in the room.

Suddenly the voice was heard, an eerie whisper that rose and fell like the night wind. The woman's eyes were closed, her body was tense. There was not a ripple of motion in the muscles of her throat or chest. Mr. Putnam began asking questions, the voice answered. Sometimes softly, sometimes in a shrill whistle of startling volume. And here is a portion of the transcript, just as it was re-

(*Continued on page* 80)

The Earhart plane was a Lockheed "Electra", bought and outfitted by Purdue University.



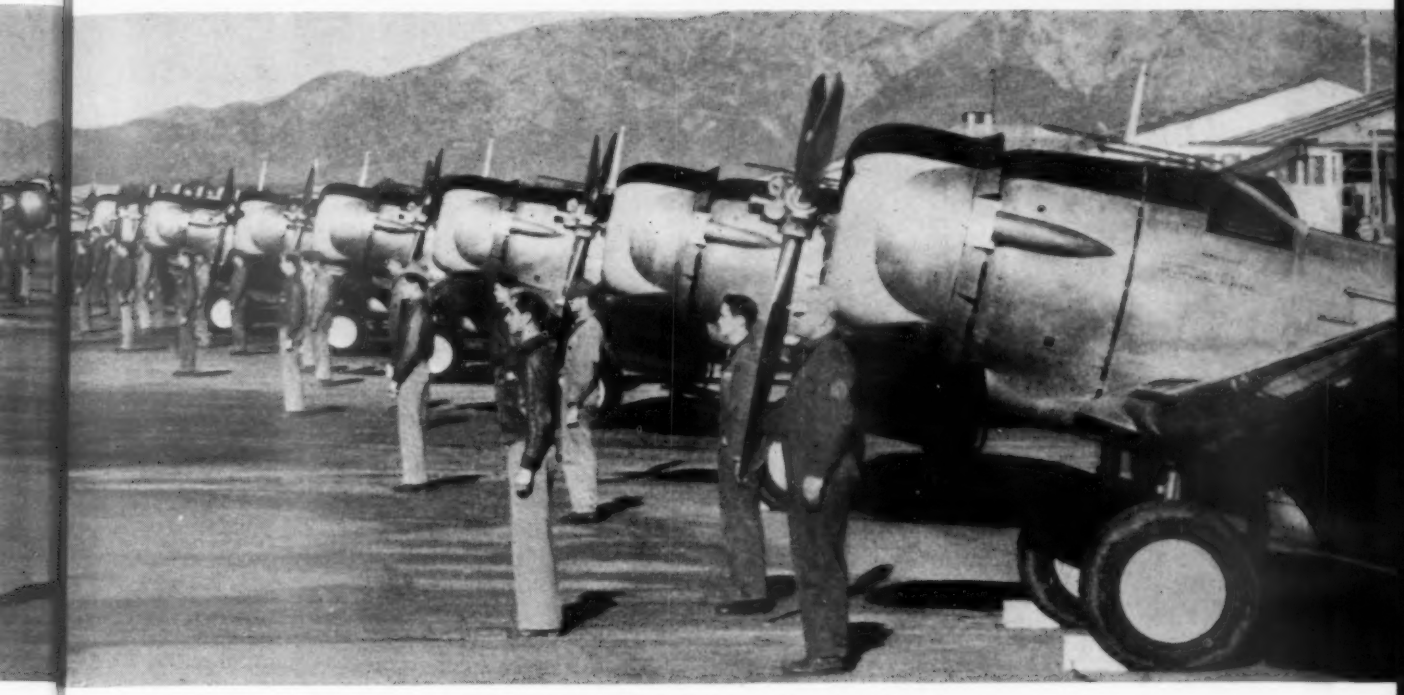
The Army pilot is well looked after by the Government. However, his job is somewhat more hazardous than

"I'd Rather Fly

Military pilots have access to the best of equipment. These are standard A-17A attack planes.

YES, I'm an Army flyer. And glad to be one. That is, I appreciate all the good points about flying for Uncle Sam and also appreciate the fact that many of the disadvantages are no greater than you'd find in other jobs connected with aviation or in other professions. Were I to describe my *own* situation exclusively and give the reasons why *I* am glad I chose the career I did and stuck to it as I have, the readers of POPULAR AVIATION might say, "Oh, he's Birnn the optimist," or "He's just one of the lucky ones," or "He's easily pleased anyway," or "He hasn't been around and doesn't know what the score is." So I'll describe a composite, call him "Charley" (a name given by Major Frank Hackett, another Army bird, to all his fellow officers) and if "Charley" and I match up, it's an accident; except Charley and I think alike and are pleased or displeased by the same things.

Charley, by the way, got his wings after 58 hours and nine minutes in the air, most of it in OX-powered Jennies. He got his wings and a commission as second lieutenant, which he remained for two years, until 1920 when he got his permanent commission in the regular Air Service and a first lieutenancy, which rank he held for 13 years (a long hold). A captaincy followed, then a temporary majority, to be followed, he expects, by



that of the commercial pilot, especially in branches of the Air Corps like the attack squadrons (above).

For Uncle Sam"

Says MAJOR ROLAND BIRNN

A veteran Air Corps officer discusses a problem that has troubled every professional flyer at some stage of his career. Is military flying preferable to civil aviation?

Major Birnn

a *permanent* majority within a month or so from the present. If he lives long enough he'll retire as a colonel, although that's rather doubtful. But rank doesn't mean so much. There are just so many jobs in the Air Corps and just so many officers to perform them, so Charley has commanded squadrons as a lieutenant (that's a major's job) and has often held down several high ranking jobs concurrently. All of which means that he has been doing work, in and out of the air, and assuming responsibilities far beyond that for which, technically, he is paid. But he'd do them as well, probably, even for less pay. For he only *thinks* he's in the service for pay, but don't let him kid you, or himself. He's flying for Uncle Sam because he likes to and because his salary and allowances let him live comfortably. Some of his friends left the service for big-pay jobs on the outside in 1927-1929—and before and since. Charley stuck, although he had real offers. There must have been a reason for his sticking. He knows several of his former fellow officers who did well outside the service; and others who didn't do so well, in the long run.

He also knows several private pilots who have their own money invested in airplanes and equipment—and work like dogs for 16 hours a day without letup on charter work, photography, dusting, etc. They undergo risks not only to themselves but to their equipment. Some make about as much as Charley does, in hard money; but have not the security he enjoys in retired pay when he has outlived his usefulness, nor do they receive an adequate return for the money riskily invested in hangars, airplanes, etc. One of these lads would sell out tomorrow and start in as second lieutenant in the regular Air Corps, but he's beyond the age limit although otherwise well qualified. Another has so much money tied up and owns his own home and wouldn't make a change. Two others concede Charley's advantages as an Air Corps flyer but wouldn't swap jobs with a general. "You Army birds are too much tied down."

Airline pilots sometimes make the same statement; especially those among the top notchers who still look ahead and see better positions in the commercial end, as do those who abhor anything but airplane piloting and look with distaste on the many administrative or technical jobs which an Air Corps officer gets in addition to his flying. (Charley is a member of a bombardment group staff.) Nevertheless, he's had many

(*Continued on page* 68)

The North American factory at Inglewood, Cal., has more than 500,000 feet of space, cost $1,500,000.

BIG MONEY

by

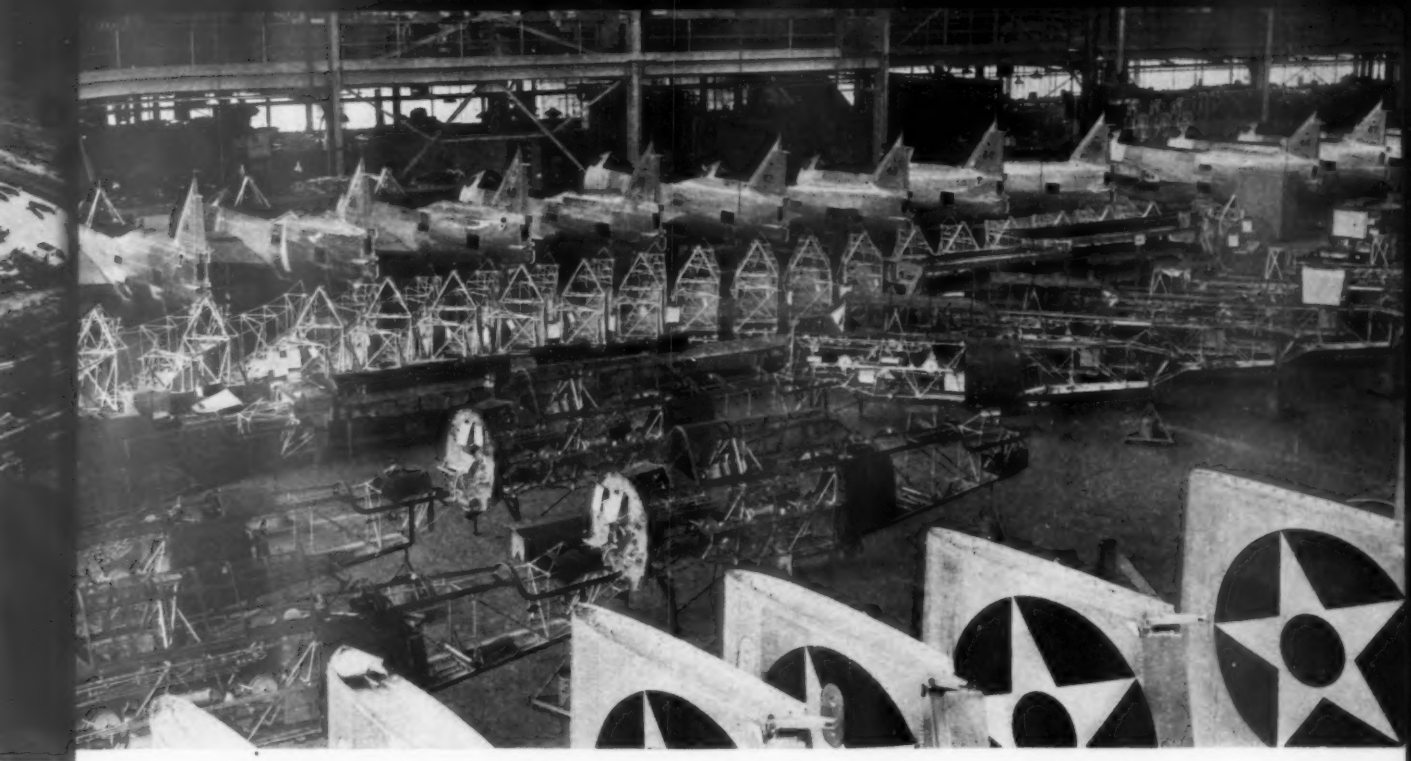
MILTON VAN SLYCK

and

SELIG ALTSCHUL

The Army trainers below comprised a juicy General Motors order. The ships are North Americans.

This is the story of the role played by General Motors in the American aviation scene today. It's a role worth millions.



North American comes closer to standard automobile mass production of aircraft than any other plane builder.

IN AVIATION

OUTBREAK of hostilities in Europe has focused attention on the aircraft industry and especially on those manufacturers prepared to immediately go into mass production of fighting craft.

Big money now is in aviation—the General Motors, the Douglases, the Martins and others. And this big money, combined with the natural inventive genius of the American people, is calculated to keep the United States far out in front insofar as quality production is concerned. As regards quantity production, inspection of just one of this nation's manufacturing establishments, that of North American Aviation, Inc., reveals something that the aircraft industry had been aware of and planned for long in advance of the outbreak of war on the Western Front.

That "something" is nothing more or less than far-sighted plans in the erection of manufacturing plants. These plants looked forward to the day when "line production" and mass manufacturing methods would be desirable.

North American, for instance, under the wing of the motor colossus, General Motors, has available in its new Inglewood, Calif., plant, more than 500,000 square feet of floor space. This is the result of expenditure of $1,500,000 in original construction and expansion some time ago. The plant is one of the most modern in the world. Production methods used in the auto industry are more closely approached here than elsewhere and the company is capable of immediately expanding operations to a rate involving more than $25,000,000 of equipment annually without simultaneous expansion of plant facilities or going on a 24-hour basis. Production currently is running around $1,600,000 monthly, the highest on record for any company in the industry.

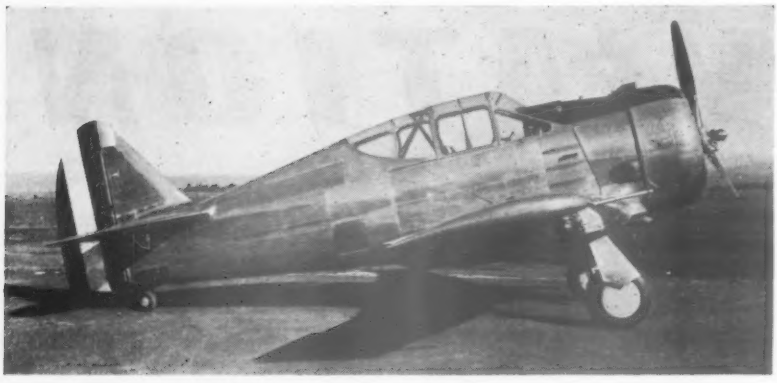
With the advent of war, General Motors is likely to become a more dominant factor in the aircraft industry than ever before, and it may well be that its sales, currently accounting for some 25 per cent of the aircraft industry's dollar output, may expand still further. Bendix Aviation Company, a controlled company, and G. M.'s Allison division are potent factors. Also, the company has a large plant in Canada which possibly could be converted for aircraft manufacture.

Back to North American, it is found that this company is in a peculiarly enviable position insofar as the European war is concerned. Europe's interest to date is not so much in the heavy, long-range bombers but rather in the light, fast equipment—the combat planes of extraordinary ruggedness and speed—and the combination light bomber-pursuit jobs. The NA-50, for instance, is basically a low-wing North American monoplane that has been reduced in proportion to a single-seater fighter and this ship has found excellent reception abroad. It is available for mass production. The NA-40B, the three-wheeled attack bomber which, unfortunately, crashed at Wright Field, probably is available for export.

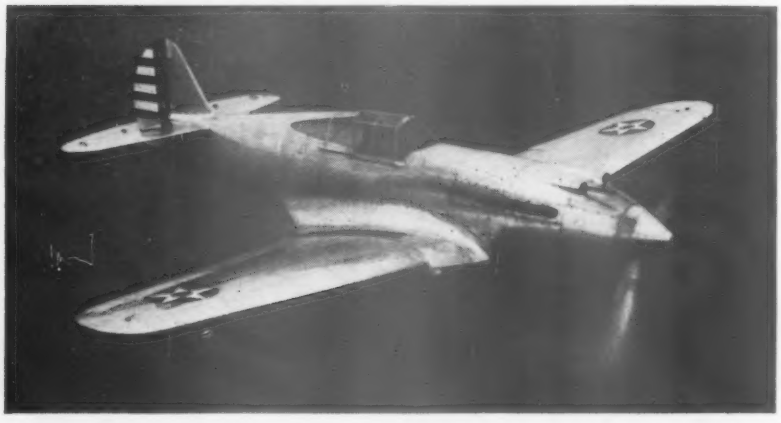
Entrance of big money into the aviation industry created a picture which was a far cry from the "good old days" when almost anyone who flew was a potential aircraft designer. The rule-of-thumb designers of aircraft in those days were wont to take an old Jenny and cut it up to their hearts' content or gather, from here and there, spare automobile and bicycle parts, baling wire and other odds and ends and—there they were. A new plane design.

Not so today. It's big money that does it and war is further stimulating the flow of money into the aircraft industry. Resources totaling millions of dollars—designers, each trained in one specialized job; engineers who were babes in diapers when streamlining was about as well known as is the cosmic ray today—now are the focal point of the process. And this process almost daily adds mile after mile to the speed of aircraft and

Extremely valuable to General Motors is its investment in the Allison aircraft engine. One U. S. Government order for Allisons like that shown above totaled $17,500,000.



This chunky single-seat fighter is the North American NA-50 for export. A number of these ships have been sold to Peru. Top speed is about 230 m.p.h., cruising 210.



The Allison engine already is standard on the Curtiss P-40 fighter (above) as well as the P-37, the Lockheed XP-38, the Bell XP-39 and the powerful, secret "Airacuda."

hour after hour to motor life, not to mention safety devices and other innovations. These have reduced to an exacting and scientific procedure what once was a gay and exciting adventure.

That doesn't mean that the individual designer hasn't a chance. He most assuredly has. The inventive genius of the American is something no amount of system or science can replace. But today the individual designer usually winds up with a Boeing, a Douglas, a Martin or any of the established manufacturers. And, usually, he fares better than if he attempted to scrape together several thousands of dollars on his own, build his plane and enter some competition.

Just how far this business of aircraft designing and construction has gone since the days when the barnyard designers and Jenny dressmakers passed their millenium is illustrated by a few figures. Not thousands, but millions on millions of dollars are involved. At random: Douglas Aircraft Company, Inc., boasts over $17,000,000 of assets; the Sperry Corporation, nearly $17,000,000; Glenn L. Martin Company, $15,000,000 plus; United Aircraft Corporation, more than $32,000,000; Curtiss-Wright Corp., $40,000,000 plus; Lockheed Aircraft Corporation, more than $13,600,000; Boeing Airplane Company, $11,000,000 plus; and the Aviation Corporation, more than $9,500,000.

This all adds up to the rather neat sum of about $156,000,000. And, that's only a partial list. General Motors, for instance, hasn't been figured in that yet. General Motors Corporation is not only the colossus of the automobile industry, but is as well the largest single factor in the aircraft industry—although G. M.'s total assets of $1,600,000,000 make its aircraft investments look rather puny.

Sales this year of aircraft by companies controlled directly or indirectly by General Motors may aggregate $50,000,000, or roughly a quarter of indicated United States production for 1939. How did the aircraft industry get that way? How did the barnyard designer grow into a coldly precise engineer with hundreds of millions of dollars behind him? The answer to that is in itself enough to fill a book. It's the history of aviation itself. Its triumphs, its sorrows and heartaches—but, always, its triumphs! Competition between warring nations in the 1914-17 era was the first major stimulus. Then, came the healthier competition between racing pilots and between transport companies. And now the cycle has been run and it's competition between nations again.

To trace this development, a good short cut lies in the direction of General Motors' activities. This company came into the picture when aviation first was getting ideas about big money—1929. A large interest in Fokker Aircraft Corporation of America was purchased by General Motors in that year. The history of General Motors' subsequent moves in aircraft and air transport is just about as complicated—but just about as repre-

(*Continued on page 62*)

This is the author, seated in the cockpit of a Hollywood warplane, about to take off for a film dogfight.

I Learned About FLYING From That! — No. 9

by FRANK CLARKE

Mr. Clarke, one of Hollywood's most daring pilots, has flown every trick in the book. All except one.

I'D pushed the ship up to about 20,000 feet. It was a Stearman biplane with a camera strapped on the wing, and with 300 h.p. in the nose. It was late morning. I had taken off from Burbank an hour and a half before looking for a hole in a triple layer of overcast. My assignment was to spin down close to a forested mountainside to match a scene which had already been taken of a spinning airplane. All I needed was a few hundred feet of film showing a forest going around and around on film. A forest with sun on it.

I hadn't wanted to go. I was pretty sure that there was little chance of finding a hole and sunshine on a day when the first overcast was nearly two miles up.

"We have to have the shot," the assistant director had told me. "If there isn't a hole around here find one some place else."

So I'd taken off. I'd climbed up to the first overcast, flown up through it, come out into the open, climbed through a second overcast and was now under a third. I'd done this without navigation instruments of any kind. But that hadn't bothered me. I'd been climbing through overcasts for years for motion pictures with nothing but a tachometer and an oil gauge. It was easy to do. All you did was watch the tachometer. If it showed the motor was revving up too fast, your nose was down. If it showed a loss of revs you were climbing too sharply. You corrected until the motor turned over at the right speed and there you were—going up. The oil gauge? If you lost your pressure it was time to start down.

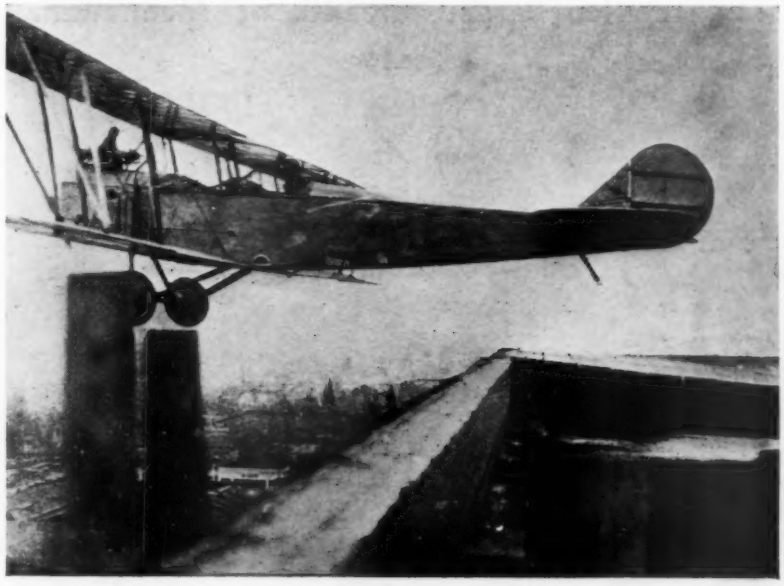
On this day, as always, I was spiraling. Spiraling right over Burbank. That involved another scientific principle. If you took off, spiraled up through the overcast and kept on spiraling after you got on top of it, all your worries were over. You were right above the place from which you had taken off—or very close to it. Because it was physically impossible to go anywhere if you kept flying in a circle.

As long as ten years before we had proved this theory. We used to spiral up through the clouds and keep on spiraling when we got over them when we were making "Hell's Angels" around San Francisco. I was the cloud scout. I'd get into a Fokker or a Travel Air or anything that happened to have my blind flying instrument in it—the tachometer—and up I'd go through the overcast, always circling. On reaching the top I'd continue to circle, seeing how the light was, and how the clouds looked. If they were big and fleecy, the kind aerial photographers liked, I'd come down. Then about 45 of us would take off, circle upward, get on top and go to work.

Going up through the muck, now and then somebody would fall out of his climb. But he'd snap out of it, level off and start climbing again with his eye on the tachometer. Nobody ever worried about the fact that 45 of us were all going up blind in practically the same cloud. We figured scientifically that

(*Continued on page* 82)

The author flew the Jenny below off a Los Angeles building roof for an early movie.



MANHATTAN AIR PATROL

by

ROBERT W. BROWN

The new patrol planes are completely outfitted with radio and blind flight equipment.

New York City's police department has revived its aviation division. Two modern aircraft, a landplane and seaplane, already are patrolling the length and breadth of Manhattan.

Both New York patrol planes are Stinson cabin ships powered with 450 h.p. engines.

IF, on one of these fine flying days, you're winging your way right merrily over New York City or its surrounding terrain, and suddenly a police whistle shrills in your earphones and a voice cries, "Where do you think you're flying, buddy, over the Western Front?" don't be surprised. Probably it won't happen, but there's a wee small chance that it could. For, after an absence of more than a year, New York's flying policemen are in the air again.

To bring you the story of those flying cops and the manner in which aviation fits into the New York police program, the writer visited New York's police headquarters recently and talked about flying with Deputy Inspector Henry Malley of the Emergency Service Division.

"To understand the purpose of our aviation bureau," Deputy-Inspector Malley said, "You must realize that we operate a peace-time unit. The planes we fly are not fighting planes, and are not intended as such. We have no intention of instituting a rigid control over the air—the regulations for flying are attended to by the Civil Aeronautics Au-

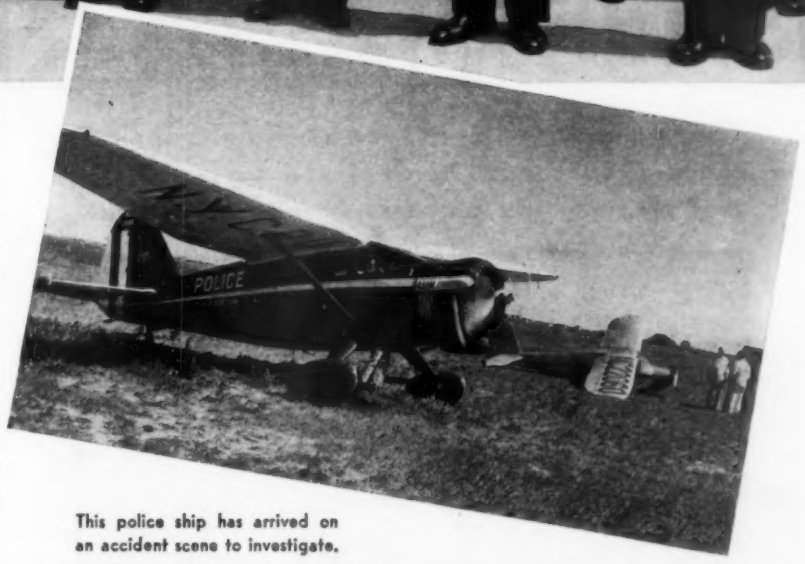
Above are personnel of New York's air patrol. There are 12 pilots and mechanics.

thority. We co-operate with them by reporting infractions of their regulations but, for the most part, our planes are utilized for the purpose of providing certain necessary services to the city and as an arm of the regular police force in traffic regulation."

In those words the inspector said a great deal. They represent a concise report on a regular police service which, during the past ten years, has been invaluable to the City of New York. They give no hint of the drama that is a part of the daily lives of the 12 flying patrolmen who constitute the air arm, but it is there nevertheless and the story is powerful.

To catch a brief glimpse of that drama let's drop back into history for a moment. The year is 1929. The United States at the time still was riding an unbridled wave of prosperity. The financial bronco was about to start bucking and throw nearly all of its riders, but early in that October an aviation bureau was established in the police department. Thirty-six men were detailed to the bureau and four new planes were ordered by the city.

In that first order were included a Loening amphibian, two Savoia amphibians and one Fleet landplane. In their day they were good ships, although their top speed was only about 85 m.p.h. They were painted the official colors——green and white—with "New York City Police Department" lettered conspicuously on their sides. In December, 1929, delivery was made and a base established at the Glenn H. Curtiss airport at North Beach. Pilots were assigned to the ships and a regular patrol schedule, covering the five boroughs of America's largest city, was inaugurated.



This police ship has arrived on an accident scene to investigate.

Almost immediately the planes proved a sound investment. On holidays, and other occasions when traffic was heavy, they were in the air constantly, hovering over the roads and keeping the traffic division informed as to which roads were congested and which were open. When distress calls came to headquarters from about the city a plane was always at hand to speed off with assistance. And when private flyers were reported flying low or otherwise violating CAA regulations the police had a means of accurately investigating.

But subsequently the equipment became obsolete. The planes were condemned by Federal inspectors and the last two were disposed of in the spring

(*Continued on page 74*)

EYES for the ENGINEER

The aerial photograph has revolutionized mapping, soil erosion control, widespread surveys, railroad planning and countless other everyday tasks.

by

EDWARD H. LAWSON, Jr.

AERIAL photography is a "war baby," spawned on the western front in 1915, that has grown up to be one of the modern planning engineer's most helpful instruments.

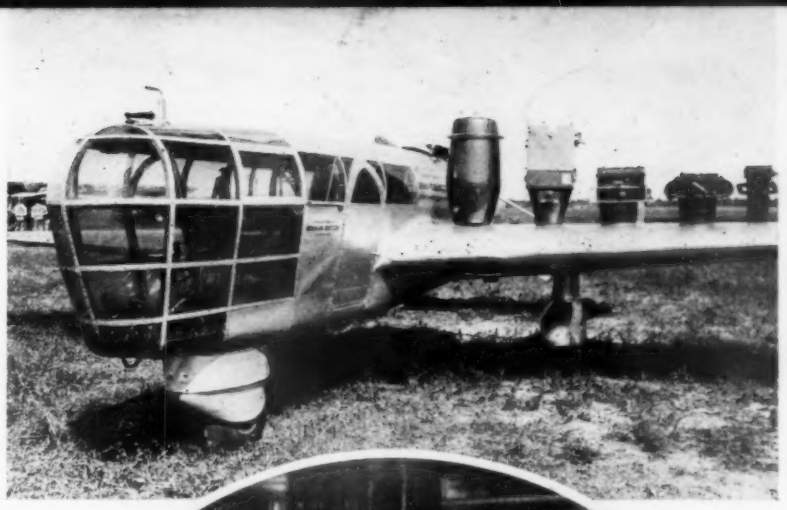
Today's frontiers of discovery and exploitation are almost wholly in the unsurveyed and often almost unknown areas of the world. It is there that aerial photography finds its greatest usefulness for, in scouting over rough terrain and mapping territory almost inaccessible by foot, it affords an accuracy equal to, or better than, that obtained by ground surveys. The more difficult and dangerous the country, the greater its value and the lower its comparative cost.

For this reason the modern planner of towns, highways, waterworks or railroads; the forestry experts, the prospectors for oil and precious metals and a host of others make constant use of the far-seeing eye of the multi-lensed air camera.

The trick of plotting engineering details upon pictures taken from an elevation is not new. In fact, it was used successfully over 25 years ago in carrying a railroad

This 8x8 foot enlargement was made from a 7x9 inch negative (contact print in man's hand).

At right is special Abrams Aerial Survey plane with cameras on wing. Center is typical vertical camera mount in plane.



through the rough terrain of China's Yangtze Valley. This was accomplished by taking a series of overlapping horizontal photos from predetermined points of known location and elevation, setting them up in a row upon a table top so that the whole valley was shown visually, and then marking off a work-line along the route that seemed to offer least resistance in the way of grades, timber to be cleared and lakes and rivers to be bridged.

But the advent of the airplane, the development of aerial photography from a wartime aid to a peacetime arm of industrial development, and the perfection of precision instruments for reducing air photographs to accurate topographical maps, have provided planning engineers with an even more effective and economical means of expediting their work.

Today the railroad builder, instead of toiling for weeks through frontier country on horseback or by canoe, simply orders an aerial survey. Within a few days the photographs are taken and, when they reach his desk, he can be certain that they accurately portray every house and outbuilding, every bed of a river or stream, every bay or island in a lake along the route he is considering. With them he can easily determine the elevation of every hill and rise along the route, pick out the lowest gaps and passes, study the surface geology and decide upon the materials of which his cuts and fills will be composed, and even check the species and the density of the surface growth with which he must contend.

After he has chosen his route, he has permanent proof that it was the best available. He can be sure that he has not overlooked a single usable variant or pass, and that wherever possible difficult stream crossings, excessive clearing of timber and the barriers formed by such "cultural" obstacles as orchards, game preserves, and graveyards have been avoided. Best of all, from his own financial point of view, is the fact that the whole route is marked out on paper before a single man goes out into the field. This means that owners of property along the proposed right of way are not given sufficient time to get together and hike up the sales price of their land.

Highway planners have reaped a similar harvest of benefits from the use of air photography. One of the first roads to be located by this process was a strip between Missoula, Mont., and Lewistown, Ida., a distance of 310 miles, built in 1930. A ground survey of this area would have cost at least $100,000 and several years would have been required before even the preliminary maps would have been available. The entire cost of the air survey was $28,000. It took only seven hours to photograph the area be-

The Army Air Corps maintains elaborate photo equipment for aerial survey work.

The aerial photograph is ideal for charting city streets. Center is a modern, many-lensed Fairchild automatic aerial camera.

tween the cities. The first mosaic maps were completed within 30 days and the whole route had been laid out before another month had passed.

This experimental effort showed beyond a doubt that aerial photographs offered an effective aid to builders of cross-country roads. Since then no better method has been found for choosing the best possible routes, determining the density of population the projected road will serve and studying its relationship with the existing highway system.

A similar use of air photographs as an aid to planning the location of oil pipelines was first tried about eleven years ago, on the Texas Pipeline Company's proposed link between Yates Bowl, Texas, and Port Arthur. The line had to traverse extremely rough and unmapped territory and had to be erected in a hurry. The engineers in charge had an air survey made. On the master mosaic they stretched a fine silk thread between the terminal points, then proceeded to examine the country falling directly under the thread. Here and there advantageous moves became apparent—a slight curve needed here, a tunnel there, a circular course about that marshy lake. Only at such points was the silk thread pushed out of its straight-line course. Finally the route marked by the thread was transferred onto the mosaic and buyers were sent out to purchase right-of-ways. Since then, many thousands of miles of pipeline have been laid out in this manner and aerial photographs have become almost standard equipment in this type of work.

A fascinating business this and, to the public—familiar with air photographs only as seen in the daily papers, magazines, and newsreels—a rather baffling one. But the whole process is simple enough in theory, if complicated as the very dickens in its actual operation.

The pictures for an aerial survey are made by flying over the area to be mapped at some predetermined altitude while a series of successive, overlapping shots is made with a special camera pointed vertically downward. These photographs are printed and then accurately matched and pieced together to give a finished product which appears to be one giant jigsaw puzzle. From this picture an amazing wealth of detailed information can be gathered by the skilled observer. Often details that are quite invisible to the earthbound eye show up sharply in the big mosaic.

A closer study of the ground is made possible by the fact that if the prints of any two consecutive exposures are put under a stereoscope, the portion of the ground that appears on both, appears

(Continued on page 66)

The vertical picture at left was made to check soil erosion in California farmland.

GRUMMAN PORTRAIT

Soaring over Washington's rugged mountains, this patrolling amphibian makes a striking picture.

Joseph Funk

TWIN EXPERTS

by GEORGE R. REISS

Howard Funk

The Funk boys didn't know "it couldn't be done". They wanted an airplane that would meet their requirements, so they designed and built one.

OFTEN a workman at the Akron Aircraft Company factory at Akron, Ohio, stumped by a particularly puzzling problem, accosts one of the Funk brothers and begins:

"Say! Now about this magneto. . . ."

And as like as not, he will be interrupted:

"I'm Howard. You'd better see Joe."

Or perhaps the inquiry will be something about airplane structure or design. Then the inquirer and the problem will be referred promptly to Howard Funk.

For one of the biggest problems in the Akron Aircraft Company factory today isn't that of selling airplanes, building airplanes, new designs, working the flutter out of a tail group, building longer life into an engine—but that of keeping the Funk brothers properly identified.

The Funk brothers—Joseph and Howard, who head the company and who designed and built the new planes which are attracting so much attention today—are twins, so nearly identical that even their workmen and their friends often get them confused. Almost identical in height, weight, features, color of hair, mannerisms, they are almost identical also in thought and action—but they have learned the secret of dividing their business responsibilities so that they can get twice as much work done.

Howard Funk is the expert on airplane structure and design and is chiefly responsible for this new airplane which is creating such a stir with its revolutionary flight characteristics. Joseph Funk is the expert on motors and, as such, is chiefly responsible for the motors that power the Funk planes, motors built up of Ford Model "A" blocks and of parts from Dodges, De Sotos, Plymouths, Chevrolets and other cars. About 75 per cent of the motors are automobile parts.

Virtually stall-proof and spin-proof, the Funk plane is otherwise quite conventional, both in general appearance and efficiency—except that it has eliminated some of the traditional dangers. And you can buy motor replacement parts at almost any corner automobile supply store at a fraction of the usual airplane motor replacement costs. That is a real item, you will readily agree, if you've waited for weeks for an expensive shipment of rocker arms or piston rods or cylinder barrels while the flying season flitted away and you almost had to float a bank loan to pay the bill.

Joe and Howard Funk are typical of that hardy breed of barnyard airplane builders who have suffered so much from regimentation and excessive regulation and, in spite of it, have contributed so much to aviation's progress and well being. Some, smarting under this great handicap, have devoted their talents to other industries, notably radio. But not Joe and Howard Funk. Their chief love is the airplane. Thwarted, stalled and delayed by regulation, the lads nevertheless have kept doggedly on, spending every cent they could earn, beg or borrow and all their spare time for years—and today they are established.

John Bunting, a veteran pilot, is president of the Funk brothers' new company.

The brothers serve as a sort of shining white hope for the be-deviled amateur airplane designers and builders—for comparatively few successful modern airplanes are the product of the backyard shop designs.

The Funk brothers were born in Akron 28 years ago and, as usual with identical twins, have been inseparable their entire lives. They attended school together, learned to fly together in an old American Eagle biplane at Akron airport in 1930. Both became so interested in flying and airplanes that Joe proposed:

"Let's build an airplane."

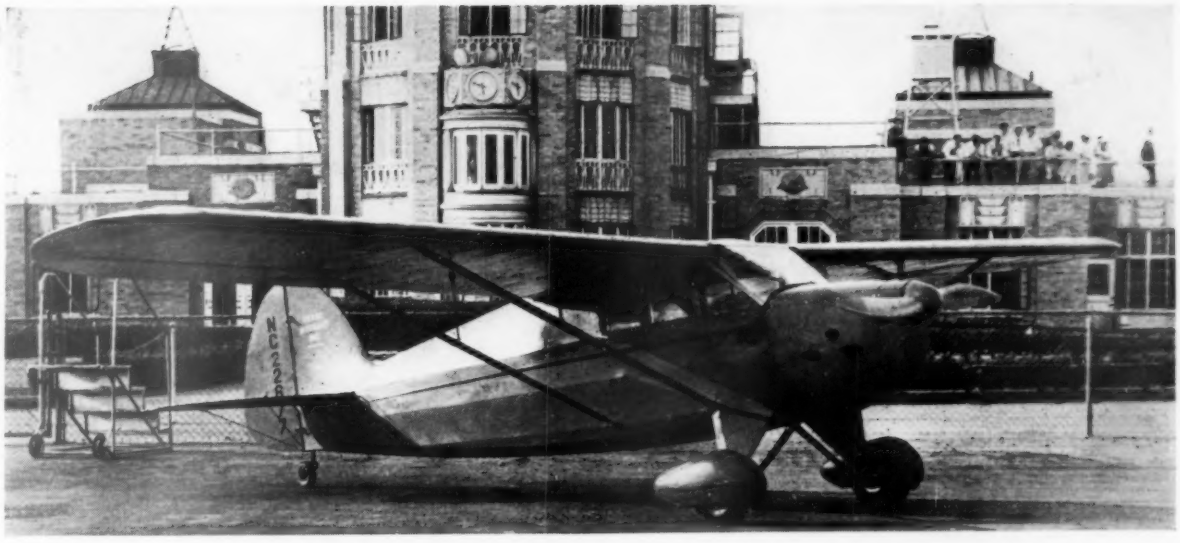
"But," protested Howard, "we don't know anything about that sort of work."

So they compromised on a two-place glider in 1932—and found how little they really knew about planes. But together they constituted a strong team. They enrolled in Akron University night school to study the things they needed to know to build and operate airplanes.

"No use," suggested Howard, "in both of us studying that same thing. That would be duplication of effort. Let's specialize."

Joe readily agreed—so to Joe's lot fell the engines and he enrolled in an engine study class. Howard enrolled in a mathematics class to enable him to better understand airplane design and stress problems.

To finance their studies and their ex-



The Funk monoplane is one of the few "homebuilt" designs ever to receive an approved type certificate from the CAA. Picture at right shows cabin and controls.

periments, the brothers opened a retail live and dressed poultry market. In the market's backroom they built their first airplane, a two-place job, slipping out between customers to weld fuselage members, put together wing ribs, or mount the wheels or motor.

"But we realized then," said Joe, "that there was only one really good way to find out what was wrong with our airplane, what faults or shortcomings it had. That was to have someone fly hell out of it—to really prove it. Howard and I couldn't do it. We were prejudiced a bit in its favor—which means we would have been making excuses for it to ourselves. Besides we had to earn a living, and we couldn't afford a test pilot."

So the brothers, satisfied that the plane was quite safe, organized a flying club, turned over the plane to the club with instructions to "give her a beating" and to report anything wrong. And, for between 600 and 700 hours, the members flew the ship, constantly uncovering little flaws which were promptly corrected. The Funk brothers got cheap testing—and the club members got cheap flying time.

Once a club member flew the ship to St. Louis, Joe Funk recalls laughingly. While he was gone, the brothers received a letter from a manufacturer notifying them of a defect in the plane's magneto and advising that the ship be grounded until it was replaced. And almost simultaneously came a telegram from the club member advising:

"Had a forced landing. Magneto trouble."

The brothers built a second ship in the poultry market backroom and it was sold to the Bureau of Air Commerce, now the Civil Aeronautics Authority—and it probably is the only ship in the CAA fleet built to the accompaniment of hen cackling.

Winning their approved type certificate, the brothers were convinced they were on the right track and began organizing an airplane building company—in spite of warnings of Akron bankers and businessmen, the Akron Chamber of Commerce and others that "it can't be done."

Somehow they raised the money, organized the company, and rented an old school building adjacent to the Akron airport and began building planes in mass production—and the skepticism of the bankers and businessmen and Chamber of Commerce has vanished. When the brothers offered $85,000 in new financing recently for additional working capital, new machinery and hangars, $105,000 was subscribed within 24 hours.

Officers of the company are John Bunting, an old Akron pilot, president; Joseph and Howard Funk, vice presidents, and R. C. Brouse, secretary.

The more than 50 employees already have turned out more than a score of ships which are being sold rapidly about the country. Performance figures claimed by the factory for the airplane, a two-place, side-by-side job with wheel control, are: top speed, 112 m.p.h.; cruising speed, 100 m.p.h.; landing speed, 40 m.p.h.; climb per minute, 750 feet. The ship sells for slightly under $2,000.

"But that doesn't tell the whole story," insists Howard Funk. "It is the safety that is the real story. Nine-tenths of the airplane fatalities result from unintentional stalls or spins and you can't stall or spin this ship unintentionally—but you can run it into a tree if you don't watch."

Disinterested pilots who have flown the ship insist that the ship virtually is impossible to spin or stall. Even with the wheel back firmly in the pilot's lap and the motor throttled, the ship refuses to stall or spin, merely mushing and dropping her nose.

Joe insists that his motors are the real secret of the ship's success—their low cost and economy. The factory claims the motors develop 63 h.p. and consume four gallons of gasoline per hour at cruising speed.

This performance compares favorably with the standard lightplanes on the market today. The ordinary 65 h.p. lightplane gives a cruising speed in the vicinity of 95 m.p.h. Probably the most important factor in connection with the Funk brothers' airplanes, however, is the ship's converted automobile engine. Airplane engine replacement parts in the price brackets of auto engine parts have been sought for many years.

"The real secret of getting aviation costs down," said Joe, "is mass production—and we're stealing a little mass production methods from the automobile industry. We buy one part, an absolutely first-class machine-made engine part that costs us 32 cents. If we changed the specification even one-thousandth of an inch, the part would cost us $8. That's typical of all our parts."

Will the engines stand up? "They will," insists Joe, telling how one of the first ships flew 600 hours without even a top overhaul.

END

Above is Lewis Imm, holding his "Librascope", important to aircraft loading. P. N. Jansen, Curtiss-Wright official (left), has important plans for plane production. Robert Gross of Lockheed (right) said: "History is made on our drafting boards."

THEY BUILD 'EM

by JAMES BASSETT, Jr.

Though aeronautical engineers rarely speak, the whole industry listens respectfully when they do.

THEY were sober faced men, most of them a little gray, pipe-smoking, not prone to quick laughter. For the time at which they were meeting wasn't propitious for much merriment. In Europe, war raged. In America, they had a job to perform—upbuilding their country's aerial defenses. Whether neutrality was repealed or not mattered hardly a tittle. What counted now was making for the United States the best, fastest, strongest aircraft money could buy.

That, a few weeks ago, set the tempo of the fourth production meeting of the aeronautics division of the Society of Automotive Engineers.

Eight hundred men convened. Some manufactured engines, some propellers, metals, bombers, giant seaplanes. Taken together, they represented companies holding most of the $300,000,000 War Department Air Corps expansion purse; certainly a topdog's share of America's half-billion-dollar aviation backlog. Taken singly they were as apt a group of engineering brainpower as you'd meet in a fortnight of Tuesdays.

One evening, still unsmiling and still clenching their husky briars between their teeth, they met in the ballroom of a gilded Los Angeles hotel to listen to the boss of one of the nation's fastest-growing plants—Lockheed of Burbank. Robert Gross, president, spoke:

"The history of the last few years is the history of the airplane."

The engineers settled back, easier. Some even smiled a bit. Then Gross continued: "It has spanned every continent and every ocean in peacetime. It has thrilled the hearts of men—" His audience nodded. This was pretty good stuff. But—

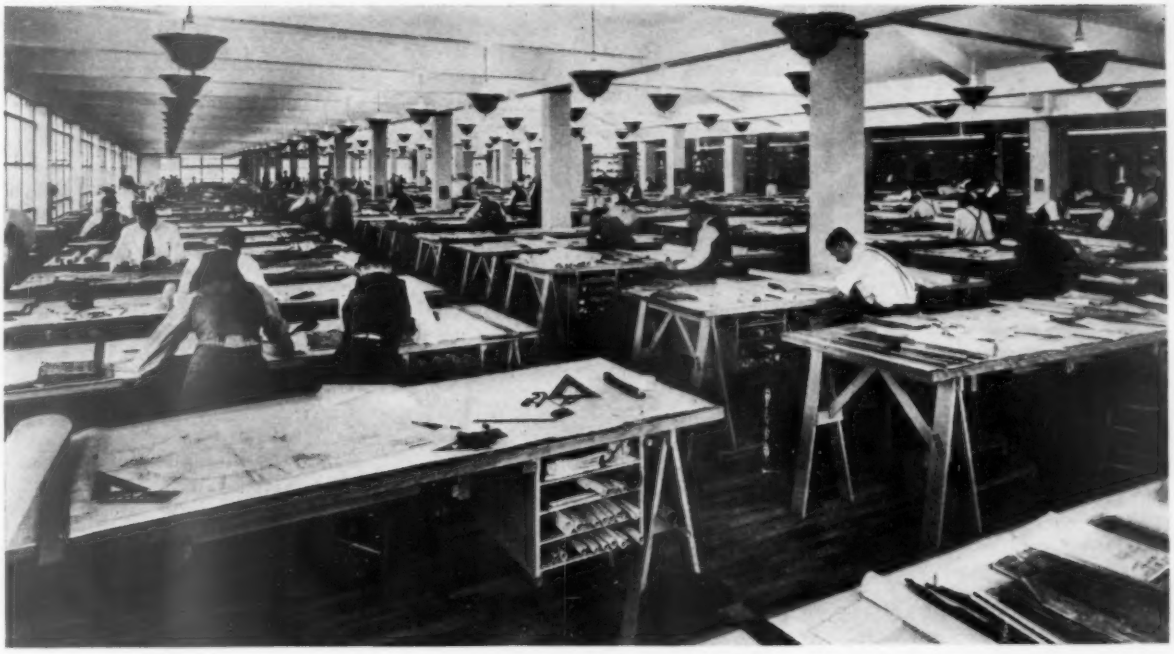
"It has numbed and paralyzed the mind at the same time with the thought of the destruction it brings! While the United States is a neighborhood because of aviation, the world has become a battleground. History today is not made in chancelleries," Gross concluded, "it's made on our drafting boards."

There they had it. Cold turkey. The kind only a man whose company built for America—and the democracies—could serve. In effect, as the S.A.E. met, it marked the keynote of the session just as much as did the character of the important aviation men who assembled.

Around them, as they talked shop, were the accouterments of their trade. Lewis Imm sent his latest computor, akin to the famed "Librascope", which automatically plotted a pilot's best flight course merely by whirling a few dials; Plexiglass was there; so were a stainless steel tail assembly by Budd, a huge hydraulic press, Pyrene's most modern gas-blowing fire extinguisher, and dozens of shiny ball-bearings, rods, tubes, pipes.

"Not in chancelleries—but our drafting boards!" Such thoughts were in their ears as they filed solemnly into the conference room to hear P. N. Jansen, factory manager for the Curtiss Aeroplane division of the Curtiss-Wright Corporation. Jansen was speaking on a subject he well knew: quantity, accelerated production for national defense. His concern's hard-flying pursuit ships stood scores-deep on the assembly lines beside Lake Erie; hundreds more flew for France over the Maginot Line.

"If," he was saying, "international danger does exist for America, we must face the airplane production problem as a reality." Then he proceeded to outline a plan which would, perhaps, send production skyrocketing should a national emergency arise. Jansen's underlying theme matched Gross's: "We know that a great modern air force in the hands of a power can exercise a tremendous influence on the morale of its potential enemies." That's why he wants America to stand No. 1.



The heart of the American aviation industry beats in the engineering departments of the manufacturers.

Briefly, this is the manufacturing scheme which the factory chief of one of the nation's busiest companies advocates: Foreign development must, first of all, be exceeded. Of all Jansen's rules, this is the primary one. To this end, experts must produce better, huskier prototypes to match the best of Europe's. As the ship is designed and built, laboratory tests and process tests must be made simultaneously. Then by the time the initial craft hops skyward on its maiden voyage, dozens more may be on the assembly ways.

Thus the War Department's "purchase of paper airplanes" which Brigadier General Jacob E. Fickel, the up-from-the-ranks commanding officer of the G. H. Q.'s First Wing, said, has proved plenty successful. "Your designs," he told the 800, "have exceeded specifications in every classification. And you are the men who build the best airplanes in the world!"

Next Jansen urged "lot system" of building. That is, keeping fabrication of parts well apace of assembly.

"In peacetime," he said, "select in each type the best available airplane." This machine should go into production in needed quantities — with an eye to eventualities. Meantime, "meet requirements with one shift". By multiplying manpower production will increase once, twice or three times. Teach each man his job; find what his particular skill happens to be.

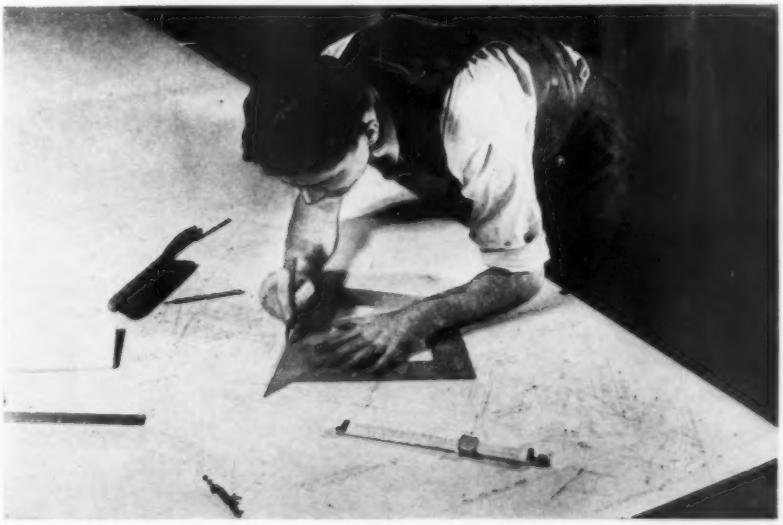
Part orders should be farmed out to smaller companies. This approximation of England's finally-working "shadow factory" system already supplies many a bustling little concern with manifold, exhaust chamber, ball-bearing and what-not business. Today, Jansen concluded, the breach between experimentation and production is small. "Pet schemes" to hammer out thousands of planes overnight might come true—some day, he said. Right now it's a matter of hard-headed organization.

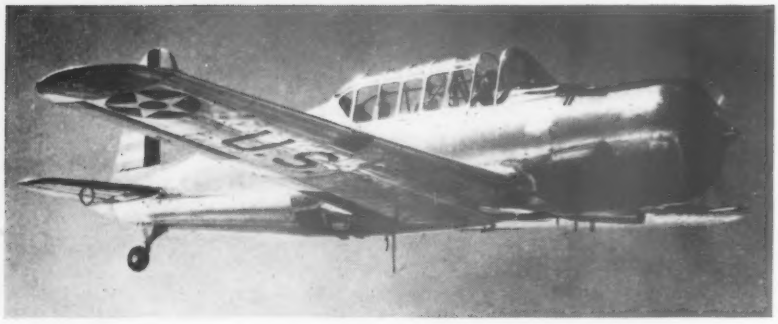
Jansen's talk gave heart to youngsters planning to enter aeronautics as a profession. Because the game, with such rules, will call for about as many smart chaps as can apply at the factories' front gates.

If the Wright super's project is to manufacture 'em fast, two of his compatriots' pet programs called for Gatling-gun efficiency in drafting brand new models. One builds huge flying boats. The other, light, fast single-engined machines. Listen to B. W. Sheahan, engineer-in-charge of drafting and personnel of Consolidated at San Diego. His is a cryptic little speech: "In July, 1938, we realized the need for development of a new flying boat. So we authorized construction of our Model 31. On May 5, 1939, exactly ten months lacking two days after we began, this airplane made its initial test flight." That was a triumph. Model 31 weighs 50,000 pounds, carries two 1,600 h p. engines, measures 5,400 gallons of fuel, can haul 52 passengers. Its performance—which experts have hinted will startle the aeronautical world—"greatly exceeds" the famed PBY Navy patrol bomber series.

How was it accomplished? Few draw-

Brigadier-General J. E. Fickel of the Air Corps says the Army's purchase of warplanes "right off the drafting boards" has proved successful and has exceeded expectations.





Vultee engineers conceived, engineered, built and flew this advanced trainer in the record time of 88 days. The job was so good the Army placed a large order.

ings were made. Details were cut to the marrow. Loftsmen did the practical work of rivet-patterning, etc. As finished sketches emerged, men plunged immediately into the task of readying tools for construction of that section. Thus, two months after Sheahan's first draftsman touched pencil to paper, the keel took shape in its jig. Less than two months later the wing center section entered *its* jig . . . and so on.

That was moving! So was the job described a moment later by Walter A. Hite, Vultee's smart young project engineer. In 88 days—almost as if they'd held a stop-watch on the race—the Downey, Cal., plant conceived, engineered, built and flew its trainer. Shortly thereafter Uncle Sam, well pleased with the ship, bought several million dollars worth.

So it went H. F. Schwedes, assistant factory superintendent for General Motors' North American Aviation at Inglewood, Cal., told how his company, utilizing assembly lines that approached those of the parent firm's automotive lines back at Flint, Mich., shuttled 103 combat and observation planes out of the plant in 23 August working days. For six months the firm ground out 74 per month. One hot August day exactly ten reached completion for a new American peacetime record.

Small wonder, that night, that General Fickel had high praise for such engineering efficiency.

"Well on schedule," he said of the two-year-plan to bring the American air force to 5,500 new and almost-new ships. Why?

"Because," stated the officer who became a brigadier-general 35 years after he enlisted as a buck private of infantry, "within three months after bidding began, we let contracts to your companies. The resultant ships, already beginning to fly, offer better characteristics than any types known today."

General Fickel wasn't bragging. His men fly those ships.

For the future, such experts as Robert Insley, assistant chief engineer of the Pratt & Whitney Company, at Hartford, Conn., offered even brighter prospects. Drafting boards today hold tentative designs of 3,500 h.p. engines, he said; speeds of 500 m.p.h. probably aren't far distant. And he thinks this country can hold its own despite the fact that "Germany probably already has bombardment craft that could span the Atlantic 'round-trip with a very minimum bomb load."

Engines play a gigantic part in this race for sky domination. Take Henry C. Hill's Wright Aeronautical Corporation

(*Continued on page 87*)

Veteran Consolidated engineers turned out this highly promising flying boat complete in two days less than ten months. The Navy is greatly interested in this model.

New Army Ratings

NOT to be outdone by the multitudinous CAA pilot ratings and those of some of the scheduled airlines, the Army Air Corps recently has adopted new designations for its pilots and observers.

The junior grade is that of Pilot. To receive this rating, flyers must graduate from the Air Corps Advanced Flying School. However, if they are reservists or National Guardsmen, they may get it if they have a pilot record of 300 hours or more, of which 100 hours must be solo, 100 hours in airplanes with engines of 200 h.p. or more, with at least 25 hours solo time in such airplanes; and they must have at least 50 hours time within the preceding year.

The next grade is that of Senior Pilot. This rating is bestowed upon those individuals who have had not less than 10 years' service in or with the Air Corps, either regular, reserve or National Guard, and have at least 1,800 officially recorded pilot hours.

Topping the scale is that of Command Pilot, for those already rated as pilots who have had 20 years' aerial service and 2,000 hours flying time in military aircraft or 15 years' service and 3,000 hours flying time. In computing *flying* time for this rating, time as pilot or co-pilot will be credited at 100 per cent, other time in airplanes at 50 per cent and time in airships or balloons at 25 per cent.

During the World War the vast majority of Army pilots were designated as R.M.A.'s (Reserve Military Aviators). A few early birds were J.M.A.'s (Junior Military Aviators) and the real old timers were M.A.'s (Military Aviators). After the war the official designation of Airplane Pilot was adopted. In 1937 a higher rating—Military Airplane Pilot—was given to experienced pilots. These new ratings were adopted April 1, 1939.

Air Corps heads long have realized that the handling of large modern aircraft or fleets of airplanes and the duties of experienced but aging pilots have each created problems requiring special administrative action. As in the huge transoceanic Clippers, the senior officer present in a *Flying Fortress* may not actually handle the controls. Nor may it be desirable for a formation leader even of smaller airplanes to pilot his own airplane while directing the maneuvers of his formation. From the point of view of the pilot, one who has had many years of flying service and pilot hours in the air and who has been through the aerial mill, has built up a fund of experience and flying lore which compensates for the slowing up of pilot technique which is the inevitable result of increased age. This deficiency in pilot technique is not missed where it is not needed, such as in the operation of huge airplanes or the direction of large formations. Hence the Air Corps Command Pilot, getting along in years,

(*Continued on page 76*)

He Gets Around

by Edward Churchill

Marshall Headle goes to more places in the world probably faster than any man alive. All because foreign countries insist on buying his airplanes.

MARSHALL HEADLE'S whole life was changed by an inter-company telephone call. Up to the time the instrument on his desk buzzed he was chief test pilot, old style. When he hung up, he was starting on a new career—that of a sort of international business diplomat. Chief test pilot, new style.

For Headle started something. Carl Squier, in charge of sales for Lockheed, was the caller. He simply said:

"Marsh, I think you better go over to Great Britain with those five *Electras*. Maybe they'll want to ask some questions."

That was in 1935 and blond, lanky and far from talkative Headle has been traveling ever since. Not only that. Headle has proved so successful in his international wanderings that other companies are sending their test pilots out to practically everywhere. It's getting so a test pilot doesn't know whether to put on his hat and go home or pick up his bag and go to Africa.

You can wash out the movie idea of a test pilot right now. No 500 m.p.h. dives for this new crop. Just a desk which gathers dust in a pilot house, a flight now and then. Headle has an assistant, Curry Sanders, who tells the boys what to do when "Pappy" isn't around to make assignments. Headle, when he isn't seeing the world from a cockpit window, has charge of a large assortment of talent, including Al De Garmo, former airline ace; Perry Hutton, ex-barnstormer who flew four years in China; Jim Barwick, former motion picture stunt pilot; and Milo Burcham, racer and stunt pilot who took up testing after announcing that his erstwhile pastimes would get him if he didn't change his ways. Twelve men in all, most of them busy airing out each new British bomber on what is called a "production test" before delivery.

Burcham, until recently in England; and Hutton, just back from there, help Headle give the lie to that national impression that all a test pilot does is tear the wings off airplanes—and to show how the test pilot is really getting away from home under the new scheme of things. When I talked to Headle, he was just going home to kiss his wife and two children goodbye—one four-year-old and the other seven—then on to Denver to check out pilots on some new "14's" for Continental Airlines

"They haven't flown these jobs yet, although they use Lockheeds," Headle says, "some I'm going to show 'em the gadgets."

Parallel, of course, to the demonstrator who calls on the lady who has just bought a vacuum cleaner to show her how to use all those new-fangled jim-cracks she's purchased. Headle smilingly admits that this is the biggest part of his job.

Squier picked Headle as a trail blazer for new product in 1935 because, among other attributes, Headle is a funny man with an airplane. He never seems to be flying one. He eases back on the wheel, the ship coasts into the air. Headle is looking out the windows, slightly bored with it all. It was confidence of this kind that Squier wanted. If Headle could yawn through a take-off, the plane-buyers would be convinced that flying a two-motored transport was child's play.

Headle goes every place by air. He's been using liners to Europe, but looks forward to a Clipper for the next jaunt. He pays his way. All employees of the company pay their way. It's a matter of ethics. The management sells airplanes to 28 airlines all over the world. It gets a fair price. So why chisel passes? Anyway, Headle landed at Southampton, where British ships are assembled, showed the lads over there what made the *Electras* tick.

"The average foreign pilot," Headle says, "learns to handle a Lockheed in about three hours of flying time. Of course, for each country we sell, we make slight changes in design so that the pilots will be familiar with the controls. In France, for instance, you never push a throttle open. You pull it open—towards you. Also in the Argentine. So we hook up the throttles backwards.

"Instrument panels are lettered in the language of the country to which the airplane is delivered. Certain specifications for equipment are adhered to for certain countries. Radio hookups, for instance. Many countries have their own radio preferences. And airline companies use different brands and different systems."

No sooner had Headle come home from Great Britain than he was sent to Poland with a consignment of seven *Electras*. The *Electras* were assembled at Gdynia. It's a nice new city, built since the World War, and Headle enjoyed himself. He caught a boat, got home in time to hang a couple of decorations on the Christmas tree and then went to Amsterdam, Holland, where he demonstrated a couple of "14's" for the Air Ministry. The ships were assembled at Rotterdam and flown up to Amsterdam. This done, he was all ready to come home when he got a cable from Squier.

So, on the way back to Burbank he stopped off in India, Java, and Australia on company business—showing the boys how to get up and down without hurting themselves or the Lockheeds.

He got home at the end of 1938 to see how the children had grown and note all the new houses going up in the neighborhood—and was off again to do a little demonstrating in Poland, show the Rumanian pilots how to handle four ships and the British how to handle five. Then he was off to France with three, and finally ended in Africa.

"I demonstrated to Air Afrique," he says. "They liked the ships and bought two more."

So he dropped off for a visit in England and landed in Burbank in the summer. Now, he makes out the schedules for his pilots, now and again hops one of the new British bombers to get some little instrument problem straightened out. He makes certain laconic remarks on looking out of the window of the yellow frame pilot house squatting beside the Lockheed runway. One, made on the take-off of a single-motored and rather antique Navy biplane which had come in for parts, was:

"My, such a lot of noise from a small airplane."

He has flown about 400 hours since the first of the year.

"And I'm going to get a small ship of my own," he says.

He owns a gold mine. The gold mine is nine hours by car from Hollywood. He could fly it in two hours. He thinks small planes are practical, these days, for just flying around and getting places without much fuss and bother. A two- or maybe four-place job would solve his

(*Continued on page* 81)

The Harlow PC-5

THE clean-looking monoplane above was designed by Max Harlow, veteran aircraft designer, who now is an official of the Harlow Aircraft Company near Los Angeles. Technically known as the PC-5, this ship was primarily intended to be both a primary and advanced trainer. This novel combination, according to the manufacturer, is made possible by locking flaps, landing gear and controllable propeller into standard positions of a conventional primary trainer. As the student advances with his training on the PC-5, special fuses are inserted in the above-mentioned control systems, thereby releasing them for operation. This automatically converts the ship into a high performance, flapped, retractable-geared advanced trainer.

Because of its design, the PC-5 has good visibility from either cockpit (see inset). Wing span is 35 ft. 9¾ in., length 23 ft. 4 in., height 7 ft. 8 in. Wing area is 185 sq. ft. Empty weight is 1,640 lbs., gross weight is 2,279 lbs. The engine is a 145 h.p. Warner. Top speed is 170 m.p.h., cruising 160, landing 45. Range is 600 miles.

Britain's Latest Warplane

LATEST warplane now in mass production for Britain's Royal Air Force is the powerful Boulton Paul *Defiant*, a single-engined two place high speed fighter. As with many other of the new designs now being produced for the R. A. F., the *Defiant* was ordered in large quantities by the British Air Ministry "off the drawing boards" (before even a test model had been built). This is a fairly common practice in England today and is being done more and more in the United States in recent months. The *Defiant*, designed particularly for large-scale quantity production, is powered with a Rolls-Royce *Merlin* engine of 1,030 h.p. The rear gunner has a power-driven machine gun turret, now being used more and more on high speed British warplanes. Although the *Defiant* has been in production for several months, no reports of its activity in the war have been received in the United States.

HAITI'S AIR FORCE

by LIEUT. G. EDOUARD ROY

★

The lone pilot in a tiny Latin American country tells his story. It is another tale of an all-consuming love of flying.

★

Lieutenant Roy, Haiti's only qualified pilot.

I AM Lieutenant G. Edouard Roy, officer of the Guarde d'Haiti. I was 28 years old my last birthday.

The marines came to Haiti when I was a youngster and from that time on I was heart and soul for aviation. I couldn't speak English in those days, for French is my native tongue, so I couldn't chat with the soldiers. But I used to hang round the field at Port au Prince, watching everything that went on as they serviced their ships, and soon I had picked up the lingo of the American pilot before I had picked up another word of English. In other words I could say "prop" and "controls" and "tail" and "rudder" before I could ask for a drink of water in English.

My father and his father and so on, back for generations, have been doctors or lawyers in Port au Prince. There's a tradition in our family that all Roys must be professional men. It seems we are descended from an old family which was prominent in King Christophe's regime. They had no idea that I would be anything but a lawyer or a doctor myself. But every cent I could make, in the bank where I worked when I got through school, was spent on aviation books—though they didn't know it.

I'd send my money over to a bookseller in Paris and he would send me a new aviation book written in French. After work at the bank I'd curl up in my room and read.

Finally, I decided that the only way I could ever hope to fly a plane in Haiti was to join the Haitian army. While they didn't have any planes in the Haitian army at that time, and still do not—I knew that this would be the first place where planes would be available in my country. My father objected at first for he still wanted me to have a professional career. Later he gave in to my wishes.

I was stationed on the Santo Domingon border just after the massacres. Later I was transferred to bodyguard duty with President Stenio Vincent of the republic. But I still wanted to learn to fly. I was still reading everything about aviation I could lay my hands on. Finally I plucked up my courage and went to the chief of staff of the Haitian army.

"I want to go to the United States and learn to be a pilot," I told him. "I realize you don't have a lot of money to spend on my training but if you can pay half my expenses, I'll pay the other half."

The chief looked surprised and told me he'd think it over. Later I went to President Vincent and talked with him. President Vincent is a very forward-looking man. He has many of the ideas of President Roosevelt. Some people even think he looks something like Roosevelt.

One day the president told me that it had all been arranged. I could go to Roosevelt Field in New York for a year. Then they would see how the thing worked out. The next thing was to break the news to my father. That was hard. He looked at me and told me I was crazy. He said that no one in Haiti had ever flown before and why should I? He pointed out that my brother was already launched on a successful career as a physician in Paris and that he himself was getting old and would soon have to give his practice in Port au Prince to someone younger. He wanted me to be that person.

But I still stuck to my plan. When the day came for me to sail away to the United States my family followed me to the dock, weeping. I had lived up to my promise to finance half my expenses myself. You see, I had an old native nurse as a child and, when she died, she left her home to me. It was just a small house but I sold it for $1,000. That gave me my half of the expenses and the government paid the other half.

I took my flight training at Roosevelt Field under Harold Illich, who now is a flight instructor with the C. A. A. I soloed after about eight and a half hours of instruction. I spent all day at the field studying ground school work and flight theory and blind flying. My classes lasted from nine to five every day. After work I would go to the hangars and volunteer my assistance as a mechanic.

At the end of the year President Vincent told me I might stay another year. In the meantime I had met Bill Gordon, a Rhode Island flyer who owned a plane. When the time came, in November, 1938, for me to leave for home, Gordon volunteered to let me use his plane for the flight. He said he would go along as co-pilot. I made the flight to Haiti in three days, stopping each night at some city en route. The first night I stayed at West Palm Beach, Florida.

The next day I headed on for Cuba. When I had nearly reached Santiago, I discovered that the strong headwinds had made me use far more gas than I expected. As we approached the city I was craning my neck looking for a spot in which to make a forced landing. Somehow I managed to crawl into the airport, with only a spoonful of gas left in my tanks. That was my most narrow escape. The next day I flew on to my home city of Port au Prince, to the field where, as a little boy, I used

(*Continued on page* 86)

Instrument flying, one of the most important phases of the modern pilot's training, is a major course in air schools.

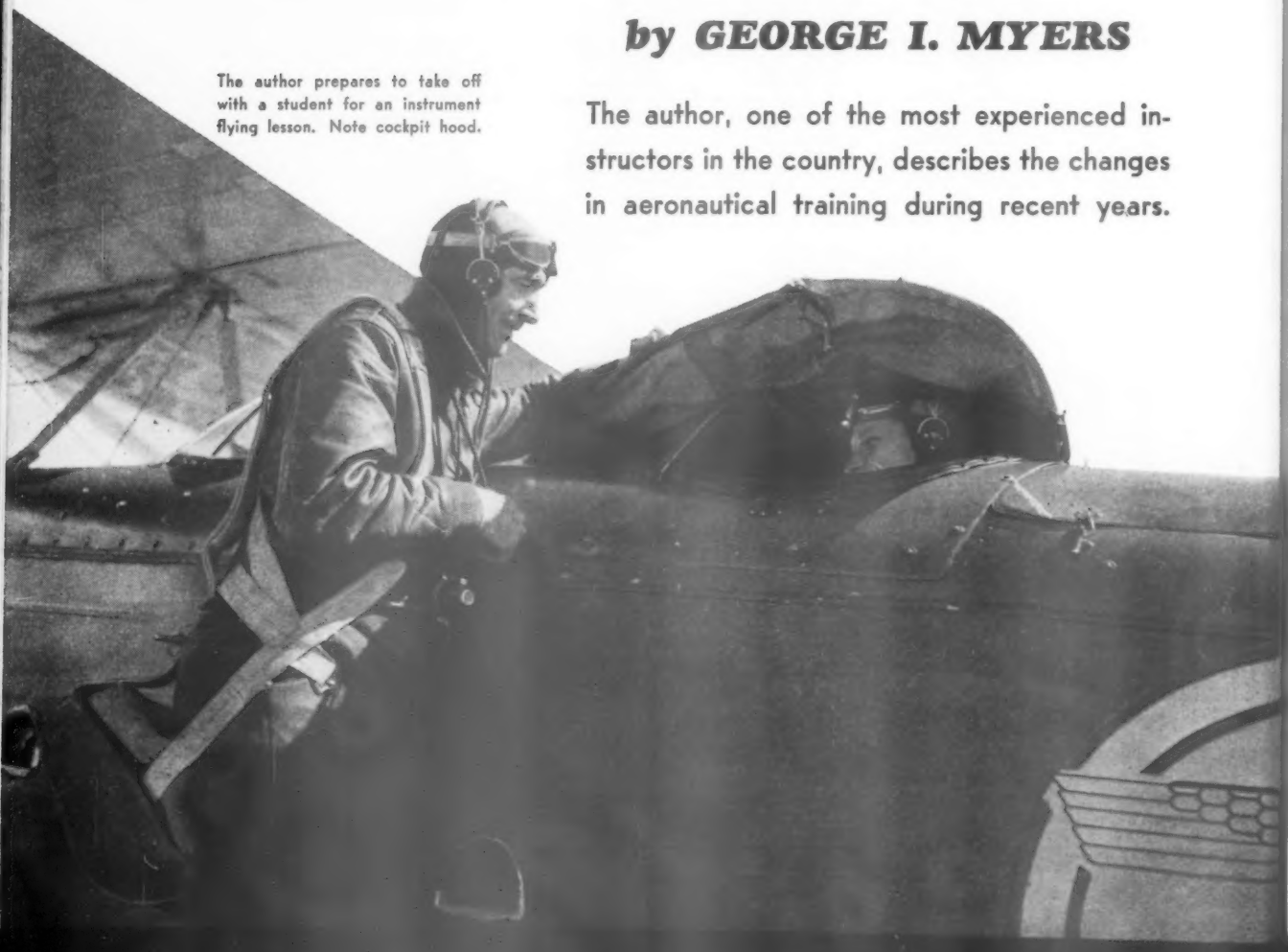
The airline-pilot-to-be learns all about the inner workings of aircraft instruments in well-equipped shops like this.

Aviation Instruction Goes Scientific

by GEORGE I. MYERS

The author prepares to take off with a student for an instrument flying lesson. Note cockpit hood.

The author, one of the most experienced instructors in the country, describes the changes in aeronautical training during recent years.



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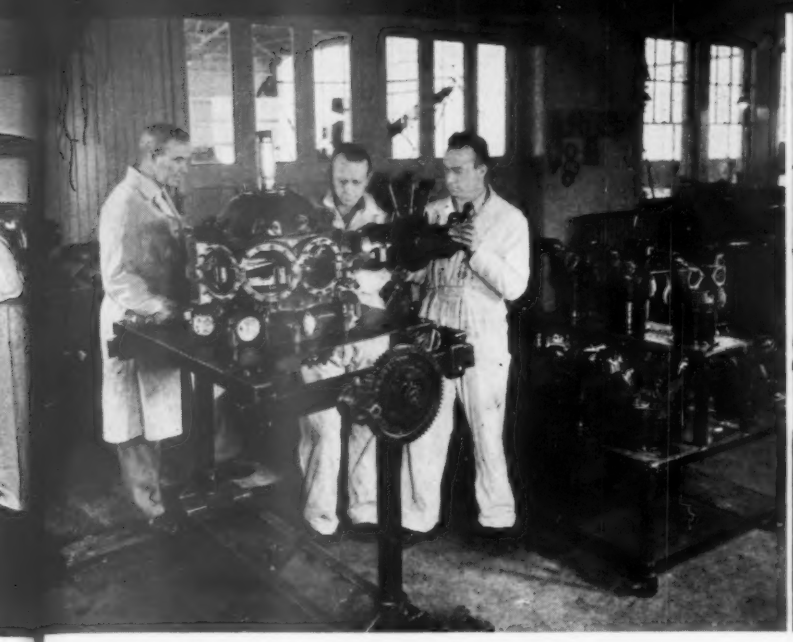


The training of the modern aircraft engine mechanic is no hit or miss proposition. The most thorough and exhaustive work is given every student.

Meteorology is a vital phase of the airline pilot's training. This student is teletyping weather data.

FLYING, as we view it now, certainly is far removed in all its aspects from the adventurous days of the early and middle twenties, when ascents into the skies were attended by all too frequent peril. How well I remember those pitch-black nights, alone, and without radio or dependable instruments to guide me across the great expanse which lay below. And there were no commercial schools in those days where one could be assured of competent instruction. Usually one learned in the military services or from a wandering barnstormer who was glad to pick up a few extra dollars in exchange for such of his skill (?) as he might be able to impart to an ambitious pupil. As soon as the individual was able to take the flimsy crate off the ground, accomplish a few acrobatics and return it safely, he was considered a competent pilot. From there on, if he continued flying, it was a matter of letting experience be the teacher. At that time uniform flying practices were rare.

Compare this picture with the requirements of modern air transportation. Note the change time has wrought even since 1928. Prior to that time a pilot with 1,000 hours and absolutely no technical training could walk into his local airline operations office, ask for a job—and probably get it—just because he knew how to fly. Today we see a young first officer dressed in the natty uniform of his company, quick in step, a serious look in his eyes and eager to grasp any new ideas about flying, avigation, meteorology or equipment. He has obtained employment largely because of his technical understanding of operations as a whole, the workings of automatic power and mixture controls, higher octane fuels, hydromatic propellers, wing and cowl flaps, hydraulic and electrical systems, supercharging, instruments and radio. This knowledge makes him a better pilot and the airlines know it. More and more, the air transport companies are coming to discount flying hours as an indicator of a pilot's ability or possibilities. They also want to know what the prospective first officer, or co-pilot, has above the eyebrows.

On his days off the young co-pilot often can be found studying subjects which will help him up the promotional steps to the position of captain or superintendent, or at the field keeping up his technique in instrument flying. With the development of scientific aviation has come added responsibilities for the airline pilot. He no longer depends upon his personal skill or luck to get him and his plane through. A twin engined transport weighing some 12 tons, cruising near the 200 m.p.h. mark, costing more than $100,000 and carrying 21 passengers, can't be trifled with like those early ships. Mere throttle pushers are no longer tolerated. The captain of a modern transport must be a capable pilot but, in addition, he must have a technical background and knowledge of his equipment, meteorology, avigation and airline operations—and he must also have the poise and ability of an executive.

In the interests of safety, Federal airways control and airport traffic control procedures have been developed and must be adhered to strictly. Believing that three heads are better than one, pilots must now check their flight plans with the meteorologist and dispatcher. Any difference of opinion about weather conditions is cleared up before the ship can leave the ground. If there is any question the trip is delayed for further data or is cancelled altogether. In flight the airline pilot of today keeps one foot on the ground, figuratively speaking, via radiotelephone. He notifies the ground stations along the route of his progress, estimates his arrival at the next check point, reports any weather phenomena and, in case of emergency, has the option of radioing the nearest station. The first ten seconds of every minute have been reserved by the Federal Communications Commission for this purpose.

Precision flying, especially in bad weather, plays a most important part in maintaining schedule efficiency with a margin of safety. The radio-range beams, direction-finding apparatus, the gyro-pilot, and other avigation aids are available now to make air transportation the service all people may use without hesitation. It is up to the apprentice pilot to be able to use them correctly.

But what effect have the technical advancements in equipment and airline operating procedures of the past several years had on the teaching methods used in training airline pilots? Have they changed? It has been our experience here at the Boeing school that training methods have changed considerably in order that our graduates might continue to meet the challenge of modern operating conditions.

I was flying for Boeing Air Transport, a predecessor division of United Air Lines, back in 1929 when T. Lee, Jr., now director of the Boeing school, asked me to organize the school's flight department. It was just then being developed under the guidance of our parent company to provide men who were adequately trained in all respects to meet the requirements of a fast-growing industry. Having been officer in charge of flying at Langley Field, principal of several public high schools, and already having had six years' experience as an airmail and airline pilot, I saw here an opportunity to combine my teaching and aviation experience in training the type of men the industry needed.

When we opened our doors at Oakland airport on September 16, 1929, a substantial number of far-seeing young men were ready to take advantage of this new training opportunity. Since that time flight

Editor's Note: The Boeing School of Aeronautics recently completed its tenth year of successful aviation instruction. In this article, the man who, as that school's superintendent of flight instruction, is responsible for the training of a large number of airline pilots, tells of the changes which have taken place in teaching methods.

The modern flying student's equipment consists of more than just helmet and goggles. Above is a typical kit which makes up the outfit of the airline pilot-to-be.

students have come from practically all 48 states, England, Austria, Java, Puerto Rico, Alaska, Hawaii, China, the Philippines, New Zealand, Australia, Canada, Central America and Mexico.

In those days the complete pilot training program was known as the master pilot course. It included 864 hours in 22 ground-school subjects and 200 hours of flying and was of nine months' duration. The classroom, laboratory and shop work offered was considered to be quite complete for this period of aviation's history. But, to show how the pilot's ground training at our school has increased through the years, let me point out that we now give 3,724 hours in 49 subjects, which require 24 months for completion. In other words, his technical training is now over *four times* as great as it was ten years ago—while actual flight experience has been expanded to 285 hours. Most people think of flight and ground training as being entirely separate, but they cannot be divided; each supplements the other. A pilot having flying experience alone is only half educated. Student pilots at the modern school now take engineering training just as if they were to enter some phase of technical operations instead of flying. While in this article greater emphasis will naturally be placed on flight training—with which I am directly concerned—we must not lose sight of the important part classroom and shop subjects play in producing a thoroughly trained pilot.

In 1929, besides our regular primary training planes, we had an eight-place Hamilton all-metal monoplane and a regular airline passenger transport assigned to us. Although the technique of instrument flying was comparatively new, we included it as part of the instruction and equipped our first ship with a hooded cockpit early in 1930. The 200 hours of flight training were divided into elementary, intermediate and advanced stages. The student first developed proficiency in taxiing, take-offs, turns, spirals, banks, eights, slips, stalls, spins and regular and emergency cross-wind landings, which required about ten dual and eight solo hours. The intermediate stage of 32 hours was devoted to a review of the elementary maneuvers, advanced air work, acrobatics with emphasis on precision flying and landings in strange fields. Three distinct types of planes were used. The 150 hours in the final stage included instrument-flying instruction in the eight-place cabin ship and passenger transport, night landings, solution of avigation problems and practice in flying the large planes with graded loads. Within a year we found it necessary to add a Stinson to our fleet and to increase the ground-school instruction to 924 hours.

With the radical change in airline equipment from the relatively slow "flying boxcars" of the early thirties to the sleek, three-mile-a-minute transports of 1933 and 1934, it was realized that a more intensive and complete course of flight training for airline pilots would be necessary. As a result, we increased the flight program to 250 hours to include considerably more night flying, instrument interpretation and cross-country work in a modern transport. Ground training was likewise increased, this time to cover a one-year period in which was given 1,056 hours of lecture, laboratory and shop work in 33 subjects.

Early in 1935 it came to our attention that certain airline pilots, seemingly well trained in instrument flying, had, in emergencies, forsaken their instruments and depended upon their own senses to get them out of trouble. Why? We determined to find the answer. Mr. Lee propounded the theory that the trouble lay in the fact that these pilots originally had learned to fly by the "seat of their pants" or, in other words, by reference to sight, hearing and feeling. In later years they learned to fly by instruments under ordinary conditions but subconsciously never really trusted them. When the real test came, it seemed logical for them to revert to their early habits of flying, since beginning impressions are usually lasting impressions. If this be the case, why should we not reverse the ordinary training procedure and teach our students to fly by instruments first?

With this idea in mind, the school began a series of experiments in April, 1935, which have led us in the past year to teach instrument technique from the very beginning to all students enrolled in the airline pilot and engineering courses, provided they have not had previous flight training. Ray Schwarz, who had won a United Air Lines scholarship awarding him a one-year course at the Boeing school, was the first flying guinea pig. He had never seen the earth from an airplane, nor did he get to see it until after he had spent more than 20 hours under the hood.

Schwarz made such remarkable progress in flying by instruments during the first six hours, that his instructor turned on the radio and started giving his instruction on locating and following the beam. Within 16 hours, all under the hood—he was able to perform take-offs, climbs, glides and steep turns; to recover from unusual positions, to work radio-range problems, to accomplish the let-down procedure—and to make approaches to the airport for landings. In other words, he proved himself capable of passing what is now the regular test for an instrument rating given by the Civil Aeronautics Authority. That test, however, does not require take-offs and landings. A veteran airline pilot was asked to fly with him through the same maneuvers and was astounded at his ability.

In the above-mentioned instance the scholarship did not provide for the complete pilot training, so the initial experiment was concluded after 20 hours under the hood and a like period of instruction by the visual method. Since that time, however, we have trained more than a score of young men who have elected to learn instrument flying from scratch and the efficacy of the method has been proved.

We have found that we can more nearly evaluate a student's mental scope and his ability to become an airline pilot in the initial 20-hour period under the hood than in several times that number of hours of flight training by the formerly established method. In the past we have had several students who had the ability to fly but who definitely were *not airline material,* because they could not develop instrument-flying skill.

Do we tell them? Certainly! It is a school policy to present the facts to the student and to let him decide whether or not he should continue his training. Instrument flying requires a high type of mental reasoning and strong powers of visualization, and some men's minds lack these qualities. The policy of telling the student of his slow progress or of his complete inaptitude for airline flying has caused some temporary heartaches, but the students are genuinely thankful for our frankness. And in the long run it wins the school a good reputation for honesty and square dealing, which more than offsets the loss of a few thousand dollars in business.

It has been noted that the Boeing school has expanded and changed its major airline pilot training course several times to meet new requirements. The importance of thorough training is being magnified now even more by the increased size of airline transports, such as the Douglas DC-4 which will be in

(Continued on page 88)

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

By GILL ROBB WILSON

THE provision for re-rating flying instructors is one of the most wholesome of the entire CAA program. In recent years the art of flying has been minimized and the art of teaching held to be little more than a demonstration. Very few pilots have looked forward to a teaching career, but have rather considered teaching as a phase by which time might be built up in preparation for an airline rating. The great majority of aviation clubs have been instructed by inexperienced pilots who gave free service in return for the time they logged. For that reason the experience of these clubs has been on the sad side.

In many instances, operators have offered to teach the purchaser of a ship to fly as an inducement to buy the aircraft. Many others have indeed advertised that they could teach an individual to fly in a very few hours and at a very low cost. What they could teach was such a superficial fragment of flight education as would enable an adaptable student to get up and down again with a whole neck.

If one wants to know why the accident rate of miscellaneous aviation has been so high for the past ten years, just study the haphazard way the victims met their fate. You will find the graduates of the approved schools, where instruction is never minimized, have not shared the unhappy lot of the badly trained pilots. There is no such thing as *cheap* instruction.

Flying is an art! It is distinctly an art. It involves mental discipline, deep concentration, habit formation, judgment, muscular coordination. These are not acquired or taught in "five easy lessons." The calibre of our instructors is the key to the future of miscellaneous air progress. Let an aviation club economize anywhere they will, except in the quality of the instruction they employ.

What we are leading up to is this. The CAA re-rating of instructors is in a fair way to create a new profession in aviation. If the plan is steadfastly carried through it will be worthwhile for a pilot to head toward a career as a flight instructor. It will pay him or her to specialize in psychology and other subjects which prepare the teacher for his life work. But, if flight teaching is going to be made a profession, the remuneration for such teaching must be high enough to attract and hold men and women of ability. Unless the instructor can make from $50 to $75 a week as a minimum, the profession will never draw persons of genuine talents.

Now the rates paid for the CAA student training program are not high enough for the contracting operator to pay his instructors what they should receive in many cases. If an instructor's time is not worth a minimum of $2 an hour, there is little hope for keeping competent men in the profession as a life work. Ordinary skilled laborers are able, in some professions, to earn much more. Unless some attention is given to this matter of pay for flight instructors the ultimate purpose of the new rating may be defeated.

Almost every pilot we know has something like this to say, "I would like to get an airline job or an inspectorship with the CAA. I want to get away from this teaching business. It's too monotonous and there is nothing in it."

It is monotonous to him because he is not a trained teacher and interested in the art of teaching. Contemplation of the rewards are no satisfaction. Airline flying is monotonous also but the reward is adequate and the airline pilot is willing to "put out" because he is well paid.

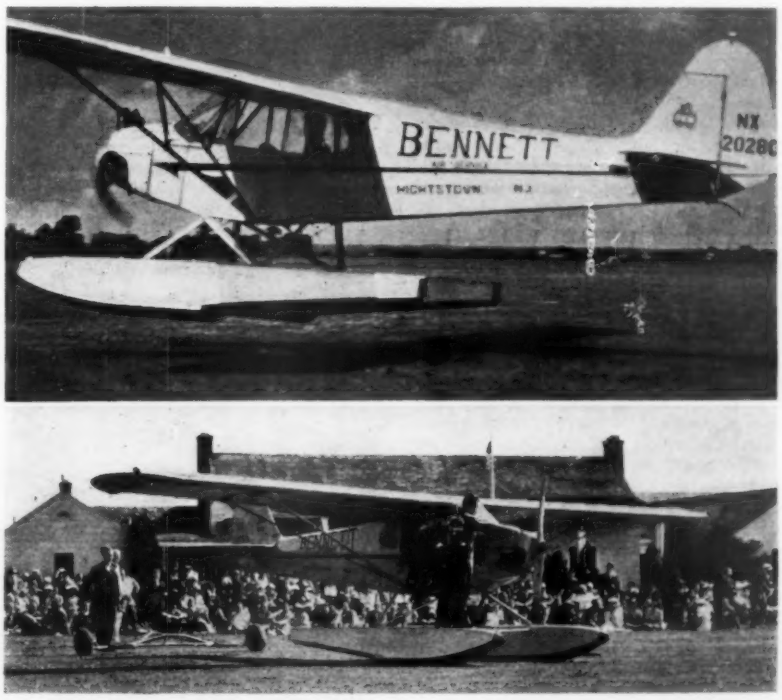
Down along the Jersey coast is a farm field with more than a hundred students in training. Verne Treat, an old airline pilot, came out of retirement to run the show. They are doing a magnificent job economically. There are many Verne Treats who will bring to the instruction field a world of experience and talent if we can make this teaching profession one of high standards and adequate compensation. But if the instructor of the future has to look forward to 30 bucks a week . . . good bye to teaching as an art!

Look at the Log Book Last

We have received numerous complaints from purchasers of used aircraft and motors that they "got stuck". *We have done something about these complaints and are in the process of running at least one pure "gyp" out of business.* But this unreliable dealing can best be dealt with by more care on the part of the purchaser. No experienced person will purchase a used automobile on the basis of a speedometer reading. Neither will an experienced aviator trust a log book instead of his own careful inspection.

A friend of ours purchased a ship last year from a stranger. The log book showed no wing repair. Our friend was impatient because we insisted that he open up the wing before flying the aircraft. The front spar was spliced three feet out from the center section fittings and had 68 brass screws in a plywood plate covering the splice. The wing had actually been recovered with the spar in that condition. In another instance where a log book showed no record, we found that a ship had been submerged for 15 hours in salt water!

We will investigate your complaints and expose crooked dealing where we can, but that does not get your money back and it does not save your neck if some unprincipled seller puts one over on you. However, there are few such scoundrels. The



AOPA Member Al Bennett recently used this means of demonstrating the safety of the light seaplane. During a show at the Aviation Country Club at Hicksville, L. I., N. Y., Bennett landed his Cub on the grass, parked, and later took off unaided.

reliable pilot with a ship to sell will want you to use the utmost precaution, for he has a conscience. It is absolutely essential that the highest ethics be maintained in aviation and *the unethical scotched and exposed the minute they appear.*

The Matter of Credit

A Mechanics Lien Law on the statute books of your state is one of the most desirable pieces of legislation you can have. It permits the repairman and the operator to extend credit to the pilot and owner who wish it. It permits the owner to accept credit without embarrassment. Some years ago, operators in the state of New Jersey asked for such a law and it was passed. It covers repairs, maintenance, new installation and service and serves to ease the entire financial transaction field. *Write to the AOPA for a copy of the New Jersey law if you wish to study the idea.*

Insurance Studies

Someone pauses to inquire, "If you could get insurance at exceptionally reasonable rates, how many pilots and owners who do not now carry insurance would want it?" The response was rather curious. Not as many as one would imagine expressed any great concern about the matter. We have always felt everyone would rush to take out the policies when the economic factors became favorable enough. Maybe the first job of the insurance groups is selling the desirability of insurance.

The AOPA may be able to develop a group plan eventually if enough owners and pilots are interested. We constantly are gathering data and it will be most interesting to see how the safety record of the AOPA members shows up against the background of the general average.

Another AOPA Party

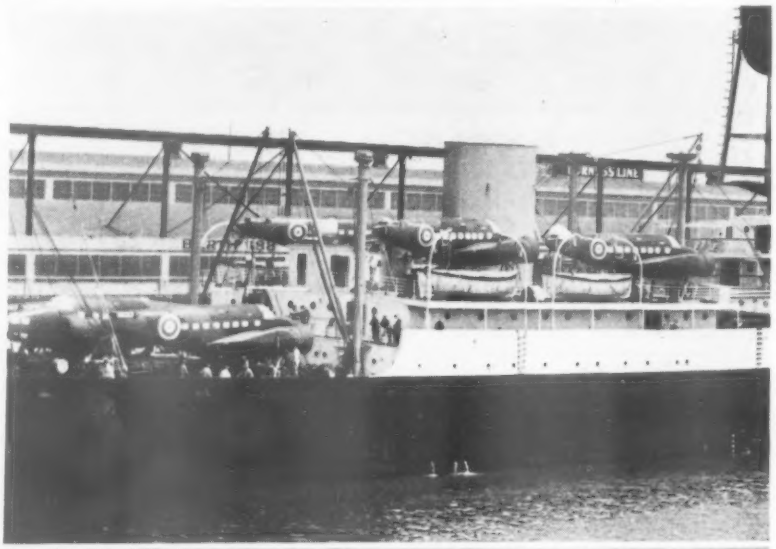
We would not normally take time out to cover an average aviation party in this column, for the AOPA is holding many parties, but the Philadelphia party introduces another element we want to mention. It is the deep devotion the average pilot feels to his cause. The night was terrific . . . driving rain, sleet and wind not fit for anything but a polar bear, yet men and women came from all over the countryside to meet in the Ambler Theatre to discuss our common problems. We had a whale of a time. Several groups were forming clubs, some wanted to talk of taxes, others of insurance and still others of service and operating procedure. We stayed until almost midnight and planned to hold a meeting each month during the winter. We know of no other single cause, from religion to politics, that could have brought such a crowd on such a night. The average pilot is an "evangelist" and, through the AOPA, we have a channel for a sound aviation gospel.

Among Other Services

Several cities have written us to help them plan a series of winter forums for local aviation groups. The AOPA will help you get outstanding speakers and lay plans for a constructive program for the winter if you write and request such service. Among other meetings should be one for high school boys who want to

(*Continued on page* 85)

American Bombers to England



WITH the arms embargo's recent repeal, American-built warplanes once again are being delivered to France and Great Britain. The Lockheed *Hudson* bombers above are part of a large order for the British government. Large numbers of these finished ships had been stored on the east and west coasts, awaiting the outcome of the embargo repeal debate. There has been talk of delivering some of these ships by flying them across the Atlantic. Pilots have been offered $4,000 per flight.

Old Timer on a Roof

THE old ship perched on the roof of a Hamtramck, Mich., filling station is described by POPULAR AVIATION'S correspondent as being a Packard biplane. The ship appears to have been powered with the OX-5 engine. Further details on this particular airplane could not be found in our reference files.

The Design of Engine Mounts

by RAOUL J. HOFFMAN

AN important but greatly neglected unit in airplane design is the engine mount. Its efficiency may be reduced if not placed in the correct position. Small differences are corrected by adjusting the tail or tabs added for that purpose.

To rectify variation in production, adjustment of the engine support or thrust line may be made on the ground. Lately, however some airliners have adopted engine mounts that can be adjusted from the pilot's seat to insure maximum efficiency with variant loads or speeds.

The design of an engine mount depends on various forces. These are the weight of the engine and its accessories, torque, the gyroscopic forces of the propeller by its vectoral displacement and the forces at the nosing-over conditions.

The torque, given in inch-pounds, is comparable to a twisting force created by two equal forces acting at the same distance from an axis, as shown in Section 1; or numerically expressed as the sum of forces times the distance from the axis. Consequently the force acting on an engine bearer is the torque divided by the distance of the bearers. For example if the engine delivers 100 h.p. at 2,100 r.p.m. the torque is equal to 63,000 $\times$ 100/2,100 or 3,000 in.-lb., and if the distance of the bearers is 15 inches, then the force acting on one bearer will be 3,000/15 or 200 lbs. acting downward and upward on the other bearer. Usually the engine is attached by four bolts and the force on each point of attachment is the torque of the engine divided by 4R as indicated in Section 2. To this force the load from the engine with the necessary load and safety factor must be added.

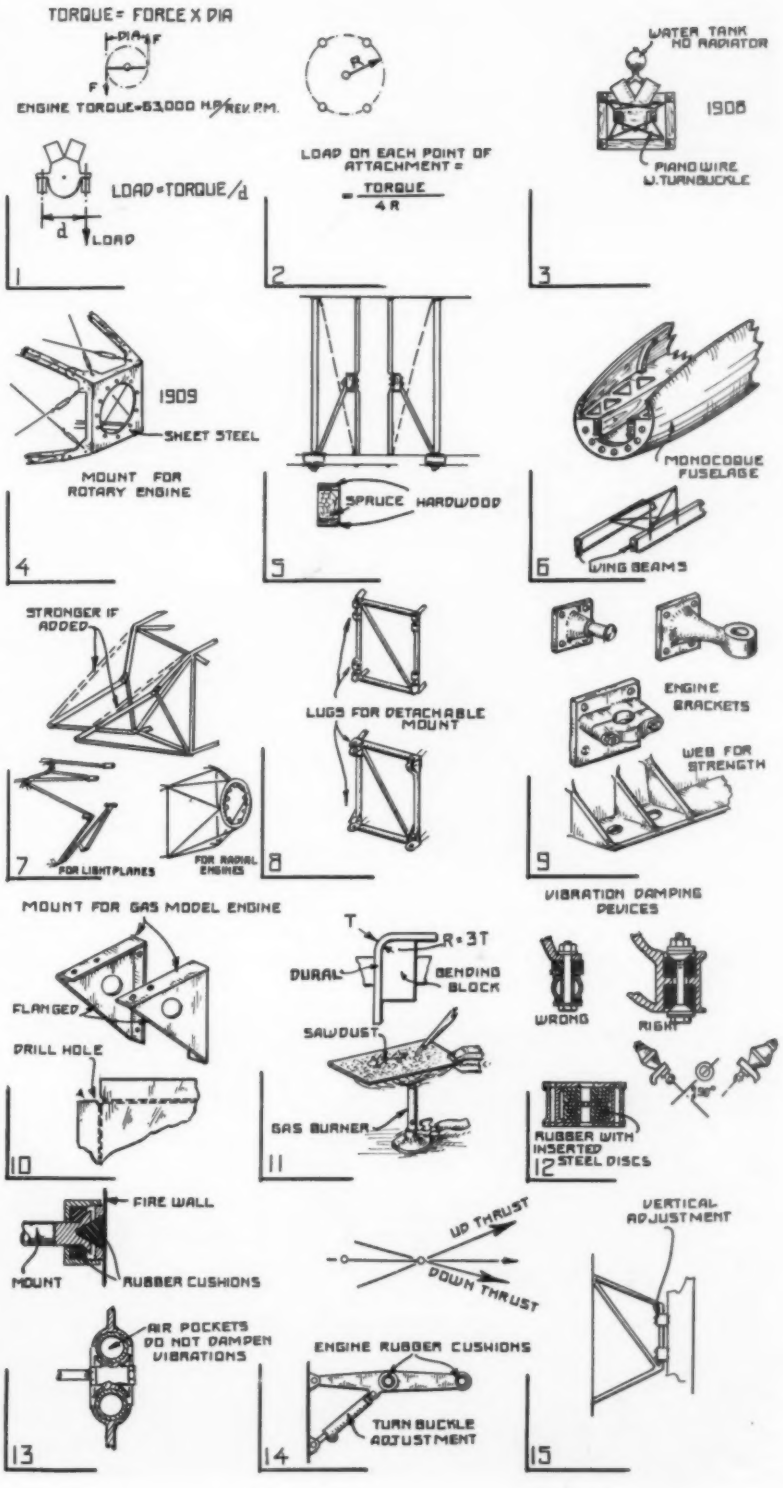
The design of engine mounts is closely related to improvements on airplane designs. In the early days of aviation the engine was fastened to two engine bearers and the whole unit suspended between longerons by piano wires made tight with turnbuckles. (See Section 3.)

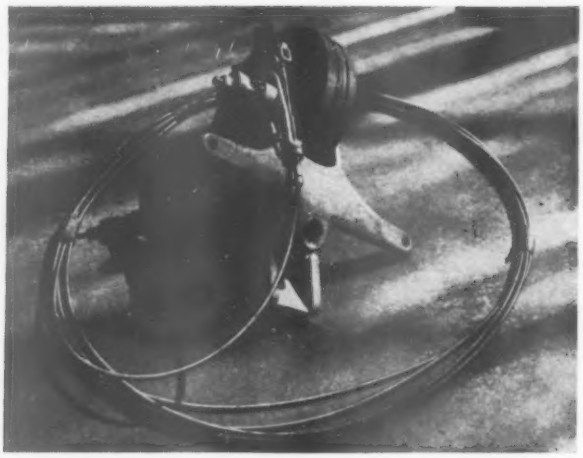
Later with the popularity of the rotary engine the mounting was easier. A noseplate made of one piece of sheet steel was bolted to the longerons as illustrated in Section 4.

Very often, as in pusher biplanes or flying boats, the two engine bearers were supported by steel tubing and cables bolted to the nose and the rear beams of the wings. The bearers were made of spruce and hardwood laminations. (Section 5.)

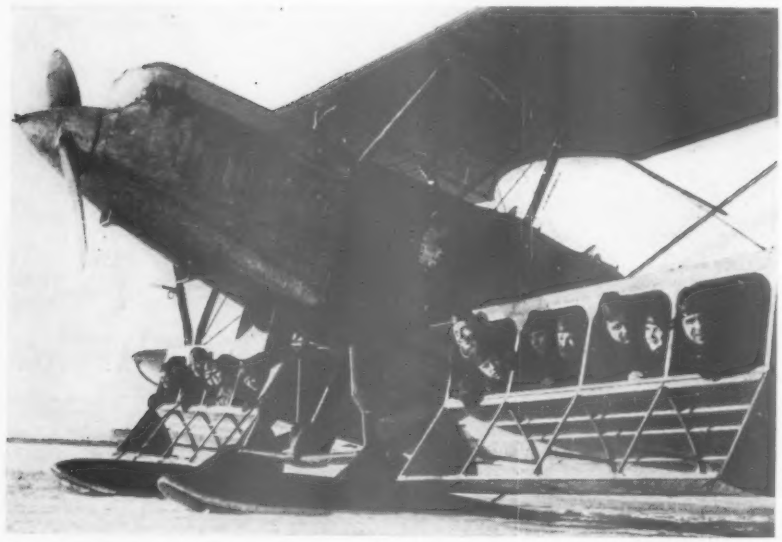
Simple was the design of an engine mount on a wood monocoque fuselage as shown in Section 6. The bearers as well as the rest of the fuselage were constructed of plywood, which permitted any kind of triangulation or double curva-

(*Continued on page* 85)





Latest thing for lightplanes is this patented tail wheel that is connected directly to the rudder. Wheel turns with rudder, facilitating taxiing. The device also is fitted with a brake.



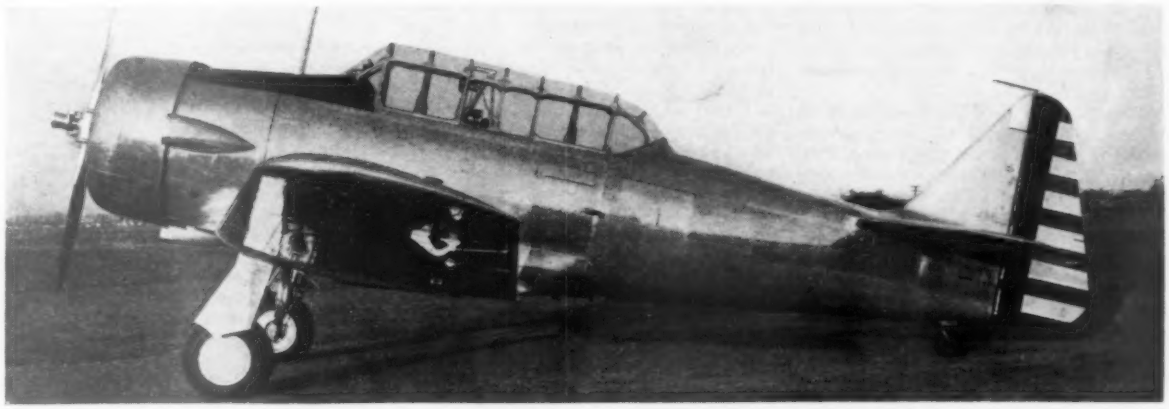
A current Russian experiment in the transportation of troops is this arrangement built into the wings of an army biplane. Glass windows close over men in the air.

HAVE YOU SEEN ?

Coast Guard planes engaged in "neutrality patrol" in Atlantic now carry large flag.

This is the way the lightplane storage problem was solved at the East Boston airport. In this manner 15 planes can be stored in the space formerly needed by five.

Latest Navy airplane is this two-place midwing Curtiss XS03C-1 now being tested. It is intended for use on battleships and cruisers. The 12-cylinder air-cooled inline Ranger is notable.



Now being supplied to the U. S. Army Air Corps in large numbers is this North American BC-1A for basic combat work. It is an all-metal monoplane for two persons and has retractable landing gear.

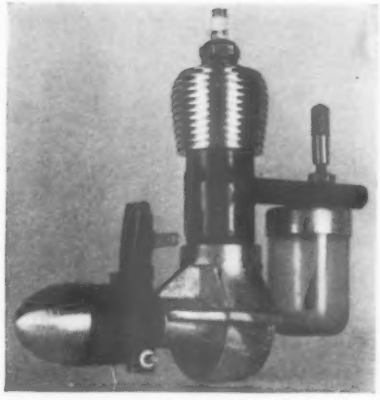
Though we don't know the whereabouts of most of the old Army and Navy Boeing fighters, this one is being used by the CAA.

Most recent Navy Department order for aircraft is for this Douglas light bomber, similar to A-17A and TBD-1 designs.

BUILD THE "HORNET" ENGINE

by PAUL W. LINDBERG
Model Editor and Designer

This month we present a little different project for the model fan: building a gas engine at home. The engine selected is widely used and reliable.



This is the finished engine, less coil and batteries. It turns up 10,000 r.p.m.

DUE to the great number of requests from our readers, we are proud to present detailed instructions on building the *Hornet* model airplane engine. This engine is one of the latest designs and will give you many interesting hours of work in its construction. As to its practicability and performance, it is second to none for its bore and stroke. Cost of materials for its construction is about $2.50. At least 50 duplicates of the one shown here have been built and tested. They all are in perfect running order up to date.

Although many model enthusiasts have the idea that elaborate machinery is necessary to make a model gas engine, that is not true. To build one or two engines any home workshop with a machine lathe is all that is necessary. To begin with, it is necessary to make a pattern of the crankcase. This is clearly explained on the plan. A split pattern is not necessary, as the foundry can make the parting in the sand. Any local foundry will gladly cast this in aluminum at a nominal fee. The crankshaft housing may be extended slightly, so that it can be gripped more securely in the chuck of the lathe. Make sure the pattern is finished to a high, smooth luster, as this will assure smooth casting. It will be necessary to clean up the casting after its return from the foundry. Do not drill holes in wood pattern for fastening down bolts.

Chuck the casting in a lathe, as shown in photo. Cut back required depth as shown on detailed print. Diameter of hole is 31/32 of an inch. After this part has been finished, a hole is drilled through remaining part of casting to receive main bearing. Note: The size of this hole is .002 inch under 5/16 inch, so that main bearing may be pressed into place. Do not press the main bearing into the crankcase casting until it is completely machined. With the casting still in the chuck, thread that portion of the crankcase which receives the crankcase cover. It will be necessary to have a thread cutting lathe for this operation. A 1 inch—27 inch thread is recommended, although any other usable thread is suitable. The casting now is removed from the chuck. The steel arbor is turned up so that the casting is slipped on for a tight fit, so that the other end of casting which receives the timer can be turned up to correct size.

The next operation will be, first, to devise a method by which to hold the crankcase so that the top part, which receives the cylinder, may be faced off and threaded to the size shown on print. We used an angle plate with small holes drilled in it to receive the crankcase flanges. Note: After main bushing has been pressed into crankcase ream bushing out with ¼-inch reamer.

The crankshaft is turned from a solid piece of ordinary steel. This is a very simple turning job and no trouble should be encountered. Any usable thread to receive the nut or spinner at the prop end of the shaft is recommended. Note the flat sections on crankshaft to receive cam. These flats are filed at a point on the crankshaft so that, when the cam washer rotates in such a position as to make regular points close, the piston will be at the top dead center of cylinder. Any variation here is of little importance, as the timer is devised with an adjustable spark advance to offset any misjudgment on your part at this point. Note: the crankshaft may be hardened and ground to ¼-inch O.D. Grind only the main part of the shaft, whose dimension is 29/32-inch. The ⅛-inch crank pin is riveted or screwed into the crank flange which is made of steel.

The crankcase cover is turned from 1⅛-inch aluminum rod. We suggest that you buy a piece of 17 S.T. aluminum, as it will be necessary to have extra stock for turning the other small parts such as timer and spinner.

Slots cut in the cover are to be used for inserting a steel piece for tightening. Make sure the cover plate screws into the crankcase freely. It will be necessary to make a slight undercut where threads end at the flange, in order to screw the cover up tightly against the crankcase. A heavy paper washer will make a perfect seal.

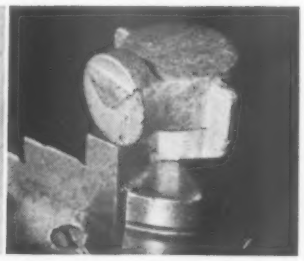
The timer assembly is clearly shown on the plan. As this differs somewhat from the one shown on the finished motor, we advise that you construct it as shown on the plan, as it is more efficient and trouble-free. As there is really very little to explain about the construction of this timer, it will be necessary to enter into such a description. We might add that, if tungsten points are not available, good hard steel points will do the trick. Phosphorus spring bronze will take the place of the spring steel if the latter is not obtainable. Note that the timer handle acts as a tightening lever for the timer.

(*Continued on page* 64)

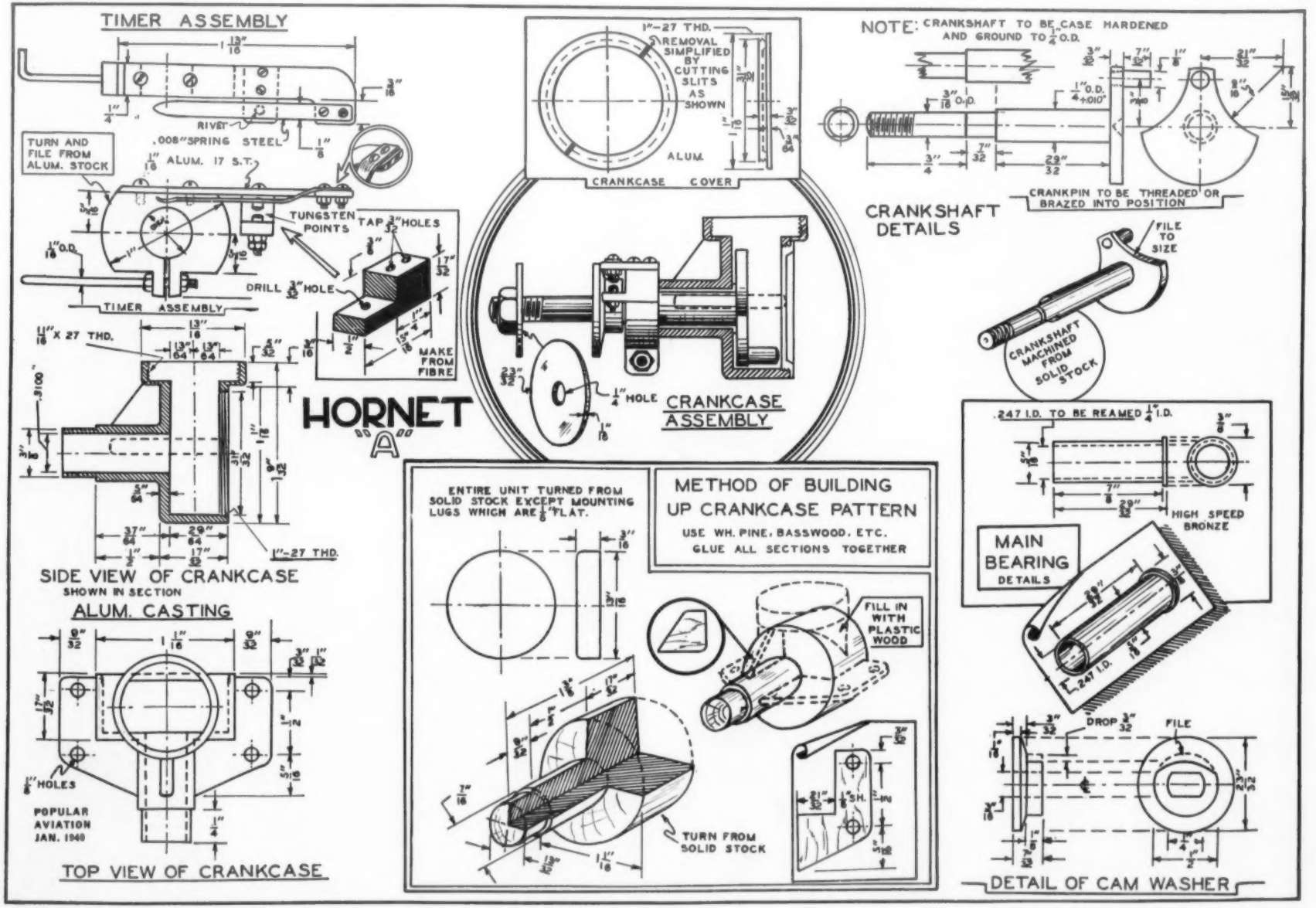
This is the finished aluminum crankcase casting and cover plate. Paper washer seals them.

Below is finished crankcase pattern. Note length of crankcase extension for chucking in lathe.

Mounted in the lathe, the crankcase is ready to be turned in.



TIMER ASSEMBLY


TIMER ASSEMBLY
RIVET
.008" SPRING STEEL
TURN AND FILE FROM ALUM. STOCK
1" ALUM. 17 S.T.
TUNGSTEN POINTS
TAP 3/32" HOLES
DRILL 3/32" HOLE
TIMER ASSEMBLY
MAKE FROM FIBRE
11/16" X 27 THD.
1"-27 THD.
SIDE VIEW OF CRANKCASE
SHOWN IN SECTION
ALUM. CASTING
1/8" HOLES
POPULAR AVIATION JAN. 1940
TOP VIEW OF CRANKCASE
HORNET "A"
1"-27 THD.
REMOVAL SIMPLIFIED BY CUTTING SLITS AS SHOWN
ALUM.
CRANKCASE COVER
1/4" HOLE
CRANKCASE ASSEMBLY
NOTE: CRANKSHAFT TO BE CASE HARDENED AND GROUND TO 1/4" O.D.
CRANKPIN TO BE THREADED OR BRAZED INTO POSITION
CRANKSHAFT DETAILS
FILE TO SIZE
CRANKSHAFT MACHINED FROM SOLID STOCK
ENTIRE UNIT TURNED FROM SOLID STOCK EXCEPT MOUNTING LUGS WHICH ARE 1/8" FLAT.
METHOD OF BUILDING UP CRANKCASE PATTERN
USE WH. PINE, BASSWOOD, ETC.
GLUE ALL SECTIONS TOGETHER
FILL IN WITH PLASTIC WOOD
TURN FROM SOLID STOCK
.247 I.D. TO BE REAMED 1/4" I.D.
HIGH SPEED BRONZE
MAIN BEARING DETAILS
.247 I.D.
DROP 3/32"
FILE
DETAIL OF CAM WASHER

Airmail for Punkin' Center

(*Continued from page 25*)

of the cabin being cleared for the mail clerk who is carried, the mail bins and the pickup gear. This gear consists of a steel cable with grapple at the lower or contact end, and a shock absorber attached to the cable. A winch is used for reeling in the cable after the pickup has been made.

The flight technique for pickup is as follows: the airplane, upon approaching the pickup station, is put into a power glide. The clerk lowers the grapple on the cable and a hemp rope with the delivery bag also is lowered so that two lines are dangling from the ship at the same time. They are kept apart in the air by the difference in their weights. As the plane reaches the station the clerk releases the delivery bag. The pilot maneuvers his ship so that the grapple touches some part of the line between the steel poles. Automatically and virtually infallibly the grapple clutches the line which is pulled away and with it brings up the outgoing mail.

The shocks of the grappling are borne by the shock absorber on the steel cable and by a special slide fitting that attaches the mail bag to the transfer line. When the line is clutched the fitting allows the mail bag to slide out to the far end. This sliding movement also absorbs much of the shock.

Pickups are made at airspeeds of 100 m.p.h. With the hydraulic shock absorbers now in use, loads up to 70 pounds may be picked up. By using spring shock absorbers already designed, heavier loads—as much as 125 pounds—may be picked up.

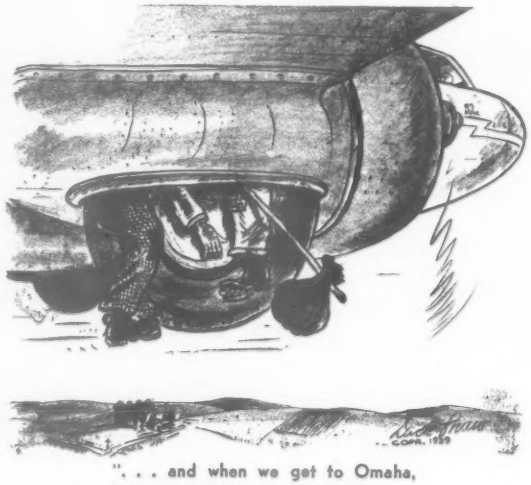
By the time Congress had appropriated funds for the mail experiments, Dr. Adams had organized Tri-State Aviation and All American Aviation, two companies that were carrying about 1,500 packages of express material daily from department stores in Pittsburgh and Baltimore to some 25 communities within 500 miles of the cities.

When bids were asked for the airmail routes laid out by the post office department Triple A won. Richard C. du Pont now is president of the company and James Ray, the old autogiro expert who was test pilot with the Pitcairn Autogiro Corporation for so many years, is chief of operations for the line. Six pilots and five clerks and the Stinsons now do the job.

A glance at the map accompanying this article shows the mail routes. Service began on May 12, 1939. On the Philadelphia-Pittsburgh route one plane leaves Philadelphia at nine in the morning and lands at DuBois at 11:36 a. m., after delivering and picking up from cities along the way. Another plane leaves Pittsburgh at 10 a. m., makes pick-ups along the way and arrives in DuBois at 12:11. Here the loads are transferred and each plane returns to its home city. The split schedule was arranged to insure service at one or the other ends of the line even though bad weather may interfere along part of the route.

On the Pittsburgh-Huntington route the plane leaves Pittsburgh at 10 a. m., landing in Huntington shortly before 1 p. m. and makes the return flight in the afternoon. The mail clerks sort the mail from each community as it is picked up so that mail from, say, Chambersburg, addressed to Altoona, will be delivered on the same flight.

Between Huntington and Pittsburgh there are 29 cities receiving daily airmail service. Of these, only 10 have airports able to accommodate even lightplanes. Yet, by connecting with trunk airlines at Pittsburgh and Huntington, these cities are all within 24 hours by mail of any city on any regular airline in the United States.



". . . and when we get to Omaha, let's get out and stretch a bit . . ."

The small cities are finding airmail of greater value than it has proved to large cities on the major airlines. Most of the larger cities also have excellent railroad facilities so that even without air transportation they would have good mail delivery. But this is not the case with many of the towns served by Triple A. Some of them, such as Glenville or Grantsville—both West Virginia county seats—do not even have railroads. They are turning with great enthusiasm to airmail. Glenville, with a population of only 800, has a daily dispatch of about three pounds. On a per capita basis this exceeds that of the world's largest airmail center.

In the month of September this route carried 2,881 pounds of mail. Of this amount, 1,295 originated at the two terminals. It is estimated that about 60 per cent of this came in over the major airlines, and that the remainder had its actual origin in the terminal cities of Huntington and Pittsburgh themselves. Of the 1,600 pounds originating along the route, more than 50 per cent came from cities with no airports.

Only about 700 pounds came from the 10 cities with flying fields. If all cities received airmail at the proportion they send it, postal revenues would have been from $2,400 to $4,000 less during the month had Triple A served only those cities with airports.

The mail poundage for the two routes since inception follow:

Month	Pounds of Mail
May	3,019
June	5,893
July	6,804
August	7,193
September	6,371
October	6,351

Much of this is short-haul mail—an order sent by store by afternoon mail can be delivered next day by air express. Because of the large percentage of this short-haul mail, no statistical figures are yet available on average load. The average daily total runs about 250 pounds. President Dick du Pont estimates that his company is now handling about 25 per cent of its capacity.

Aside from the big cities of Philadelphia and Pittsburgh, there are about 900,000 persons along the routes served. On the basis of direct payments made by the post office to domestic airmail contractors, the gross annual cost of service will average about 21 cents per capita. The same average for the major airlines is 40 cents per capita.

Postal revenues on the pickup routes have not yet reached a point where they cover this cost completely, but the growing volume of mail indicates that the Government soon will reach the break-even point, and that faster service will soon be a profitable item for the post office department. Moreover, calculations indicate that a national network would reduce the average haul of airmail to the point where it will show as good a margin of profit as first-class mail does today, and that it will triple or quadruple the traffic now carried by the major airlines.

All the flying done to date has been contact, and there are no night schedules. All planes, however, are equipped with two-way radios and other blind-flying aids and all pilots have instrument ratings. On a few occasions weather conditions have forced the pilots to go on instruments over portions of the route and they have, therefore, missed delivery and pickup at certain individual stations. A few complete cancellations

(*Continued on page 70*)

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BUY A NEW CUB IN TIME TO FLY ON THE 1940 CUB CONVOY TO FLORIDA

Big Money in Aviation

(*Continued from page 34*)

sentative—as the industry's as a whole. Moreover, the history of General Motors' trials and errors in aviation bring to light one of the most exciting phases of contemporary aircraft engineering . . . the fight for supremacy between the air-cooled and the liquid-cooled engine, the latter being represented by the Allison engine, a product of General Motors. That, too, is a story which would fill a book—providing General Motors and the United States military headquarters would give out the details. But they won't and, because of the veil of secrecy which has been wrapped about the 2,400 h.p. Allison liquid-cooled engine, it is not supposing too much to believe that therein lies the United States' bid for air supremacy.

Location of the Allison plant along the Indianapolis Speedway at the Indiana capital came more or less as an accident. It just happened to be put there. General Motors came along in 1929, saw it, liked it, and now it is the Allison *division* of General Motors. This is not to be confused with the Allison Engineering Company which is merely a sales organization with very limited capital at its disposal.

Paradoxically, the history of this engine—reputedly the most powerful liquid-cooled engine in the world as regards ratio of weight to horsepower—is both romantic and yet most unromantic. Its history could be started out like the familiar childhood fairy tale: "Many long years ago" a printing concern of Indianapolis, Indiana, was run by Jim Allison. He printed coupons and other things. From there the tale takes a devious course. Sometimes it almost disappears but, though reaching gossamer fineness, it leads ultimately to the General Motors Corporation. In the meantime, it touches on Prest-O-Lite, the Indianapolis Speedway, marine motors, Florida real estate, bicycles and the early horseless carriage—just a few of the things to which the Messrs. Allison and Fisher turned their restless energies.

That's how Jim Allison and General Motors came to be identified with the Allison engine, one giving it his name, the other owning it. Recently, the Allison division received awards from the War Department for liquid-cooled aircraft engines aggregating $17,750,000—more than one-third of the total business allotted all aircraft engine manufacturers in this competition. In order to switch from the experimental stage to volume production. General Motors is spending about $6,000,000 on plant expansion and new machinery. Completion of this program should permit an output of a dozen complete engines daily.

From one spectacular achievement to another, General Motors is about to share in the development of one of the most startling scientific devices ever introduced in the forward march of aviation. Only a few months ago it was revealed that commercial airlines at Newark airport and elsewhere had tested a new instrument landing system. This system — also euphemistically called "blind landing"—is designed to enable a pilot to guide a plane to a runway without seeing the ground, thus overcoming aviation's greatest enemy: poor weather at point of destination. After extensive research and development, the device has been perfected and is to be commercially introduced as the Bendix Air Lines Instrument Landing System. General Motors came to share in this development through ownership of about 25 per cent of the outstanding stock of the Bendix Aviation Corporation—the progenitor of aviation's newest safety device. Moreover, it was not until General Motors became actively interested in its affairs that Bendix was able to feel the assurance of unlimited resources in going ahead with the expensive research so necessary in the development and perfection of scientific aviation devices. Although General Motors purchased its Bendix interest in April, 1929, it was not until recent years that General Motors' management and methods have manifested themselves in the affairs of Bendix. General Motors has invested more than $15,000,000 in Bendix—no half-hearted participation and clearly indicative of a further desire to share in the development of the aviation industry.

Prior to 1929, the automotive industry served as the main sales outlet for Bendix. The company's aviation division, however, has taken on increased importance. Estimates place 1937 aviation sales at about $8,000,000, or 19.7 per cent of the company's total. During 1938 sales to the aviation industry contributed an estimated $13,000,000 or 42 per cent of the total gross. The importance of Bendix's aviation enterprises may best be indicated by the fact that Bendix products account for about 10 per cent of the money expended for airplanes and equipment in the United States. Bendix's aviation volume for 1939 is estimated at about $20,000,000, with a somewhat higher figure for 1940. The increasing number and complexity of instruments and radio equipment should assure Bendix products a constantly broadening market.

The preponderant cost of an airplane is made up of motors and propellers, instruments, radios and other equipment, rather than the fuselage. For example, as a generality, the value of an airplane, apart from motors and propellers, is probably more than half made up of instrument and equipment costs.

Bendix conducts the bulk of its aviation manufacturing through Eclipse Aviation Corporation at Bendix, N. J.; the Pioneer Instrument Company in Brooklyn, N. Y.; the Scintilla Magneto Company, Sydney, N. J.; Bendix Radio Corporation, Chicago and Baltimore; and the Julian B. Friez & Sons, Baltimore. About a year ago, the Eclipse Aviation Corporation moved into a newly equipped aviation plant, erected at a cost of $2,000,000 at Bendix, N. J. Over 300,000 square feet of floor area and more than 1,200 people are employed in this plant. Virtually all the generators manufactured for aircraft in the United States is produced by this company. This company also manufactures dyamometers, superchargers, de-icing equipment, vacuum pumps and similar devices. All told, Eclipse turned out over $4,000,000 worth of aviation products during 1938. Output can now be expanded two- to three-fold without the necessity of making important additional capital outlays.

The Bendix Radio division came into existence during 1935-6 through the purchase of leading units already established in the field. Radio devices are vital to aviation and this fact is reflected in the $4,000,000 sales recorded during 1938 by this division. The company, moreover, has a virtual monopoly on certain types of receiving and transmitting equipment which the Army has adopted for its large bombers. This equipment costs from $5,000 to $12,000 per installation. The definite shift from

(*Concluded on page 64*)

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(*Continued from page 62*)

contact to instrument flying may provide a positive boon to sales for this company.

During the halcyon 20's, the name of Tony Fokker stood as a symbol of aviation and was popularly associated in the public mind as such. The old Fokker Aircraft Corporation of America was built around the engineering ability, prestige and name of this inveterate designer from Holland.

It was through the acquisition of 400,000 shares of stock in this company that General Motors, barely more than 10 years ago—in early 1929—got its feet wet in the aviation business. After throwing in other considerations, General Motors valued its Fokker investment at $7,782,342 towards the close of 1929. It is of value to point out that of the two phases of aviation, manufacturing and flying, General Motors came to the conclusion that the manufacturing was the more profitable, at least the more clean cut. Perhaps G. M. was aided in this decision by the Air Mail Act of 1934, but the fact remains that the trend pointed to that clear-cut divorce prior to the Act. General Motors' 1939 annual report stated that there is a "more or less close relationship in an engineering way between the airplane and the motor car . . ." Starting from this point the trail leads through a constantly shifting picture—one which records acquisitions, consolidations, divestments and gradual divorcement from all air transport activities, and confinement solely to manufacture.

Along in April, 1933, General Motors also became interested in North American Aviation, Inc. and acquired 300,311 shares, or 8.74 per cent of this company's outstanding stock. By this time the name of Fokker Aircraft had been changed to General Aviation Corporation and General Motors had increased its holdings in this company. To simplify matters, General Aviation Corporation exchanged most of its assets for a 43.26 per cent stock interest in North American Aviation, Inc. After it was all over, General Motors came up with the ownership of 1,015,061 shares or 29.55 per cent of the stock of North American Aviation, Inc., as of December 31, 1934.

This same North American Aviation, Inc., at one time in its corporate history, had participations in properties that later developed to be the giants of the aviation industry. The Sperry Corporation, once a completely owned unit of North American Aviation, is now a proud old lady on its own and is regarded by many as one of the premier companies in the business.

An interest in Douglas Aircraft Company also was owned at one time by North American. Although this Douglas investment was sold at an early date at a profit of almost $1,200,000, the gain would have been enormous had North American held on and liquidated during the aviation booms experienced in the last year.

Transcontinental & Western Air, Inc., Western Air Express, Inc., and Eastern Air Lines, Inc., all were owned completely or almost entirely by North American Aviation. Due to the terms of the Air Mail Act of 1934, all these transport properties were turned loose on their own and developed into independent and strategic air carriers serving the important traffic arteries of the country. It was not until early 1938 that North American, with the sale of its Eastern Air Lines, was completely out of the transport field. As a result General Motors, through North American, had as its major aviation activity the manufacture of military aircraft.

North American found it advisable to move its manufacturing activities to Inglewood, California, in January, 1936, because of better climatic and working conditions. Since then more than $1,500,000 has been expended in original construction and expansion, making it one of the most modern aircraft plants in the world. More than 500,000 square feet of floor space is available to the company, and this is estimated to permit an annual production capacity of more than $25,000,000. Because of the General Motors influence, production methods used in the automobile industry are probably more closely approached at North American than by any other plane manufacturer. At the present time North American has an order backlog of about $32,000,000. Production is running at the rate of $1,600,000 per month, highest for any company in the industry.

Application of the automotive world's "line production" methods to aircraft manufacture and increased military and private demand is bringing down costs. Research and development in modern and scientific laboratories, made possible by the "big money" backing of aviation, is bringing innovations almost daily. However, there is one factor in the picture which neither money nor Governmental pressure, such as exists in certain European nations, can stimulate—and that is genius of the man who loves aviation, the inventor who hopes to revolutionize the industry. He is the man who often enough, is responsible for the great forward steps which the laboratories of large companies perfect and apply.

END

Model Engine

(*Continued from page 58*)

The cam washer is made from ordinary steel and is a simple lathe turning job with a little hand filing. This may or may not be hardened, as the wear on this cam is so slight it is not necessary that it be hardened. Make sure the cam washer fits snugly on the crankshaft. The face of the cam washer, which rides against the propeller, may be knurled slightly so as to cause a gripping action at this point.

Next month we will present the other drawings and data on the completion of the motor, together with its care and maintenance.

END

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Why not start controlling the wonder and guesswork in your future by preparing for an important career in the great and growing modern aviation industry?

DO YOU have a good educational background—high school or better? Are you alert and serious-minded, and do you want a career? If so, here is news for you: The Boeing School of Aeronautics is helping just such young men as you to use valuable school years as a foundation for a thorough training for successful aeronautical careers. Its graduates are at work today in 43 different organizations. Prepare to join them. Use the coupon.

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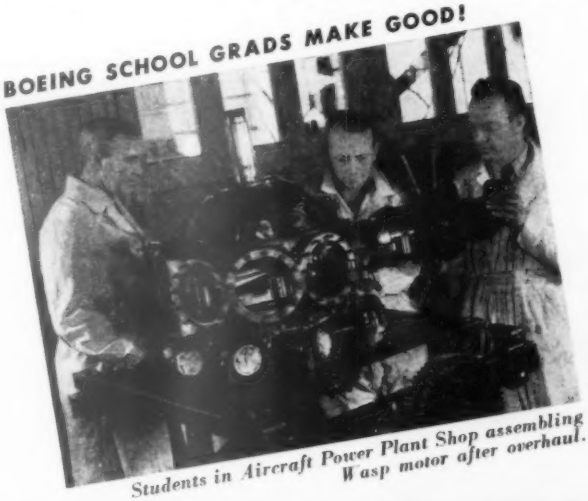

Students in Aircraft Power Plant Shop assembling Wasp motor after overhaul.

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Eyes for the Engineer

(*Continued from page* 40)

as though it were a plaster relief model. This provides a clear idea of the contours of the country and its geological formations and enables the engineer to study grades and variants as well as flat-surface features.

Not only the planning engineer, but the prospecting chemist and metallurgist as well have learned to utilize air photographs as a means of stepping up the tempo of their usually slow and tedious work. This is possible partly because one can discern from such photographs the gradual change of vegetation over wide areas. Since vegetation changes are usually due to variations in mineral or chemical enrichment of the soil, the presence or absence of certain elements can be detected. The aerial map also shows faults and other structural features where there might be mineral outcroppings, as well as elevated stream channels, the gravels of which are frequently good gold prospects.

Widespread operations of this sort are being carried forward feverishly at the present time by many countries which find their home supplies of iron, lead and copper gradually running short. Great Britain is making every effort to locate new ore deposits in New Guinea and northwestern Canada. France is searching for the same products in her African possessions. Japan's most recent aerial survey disclosed a 5,000,000-ton bauxite deposit on one of her mandated islands and a company already has been formed to mine it.

Oil cannot be so easily discovered by this method, although on occasion prospective well locations, spotted on air photographs, have proved first-class producers. However, the oil business is one of the biggest users of the aerial survey. This is because Texas and Louisiana, where a large percentage of our oil wells are located, both are deficient in mapping. Boundary disputes are so frequent and costly that each company has taken to making its own maps as a protective measure. Far too much territory is involved for the time-honored ground survey method, so aerial photography is used almost exclusively. Now, whenever a title problem comes up for solution, the engineer and attorney are able to find on the mosaic map all physical features indicating tract occupancy, such as fence and brush lines, roads and streams, and are able to check the limits of the tract as occupied against the way it is delimited in the deed description without stirring from their desks.

The lumberman uses aerial surveys for the same purpose, but he has developed a few additional tricks of particular value in his business. Air photographs furnish him not only with the fundamental details of topography of areas which he owns or is thinking about buying, but also give him a great deal of important information about the character of the forest. The area of the wooded sections, the species and condition of the stand, and the manner in which it can be transported to the mills can be taken from the aerial photographs by an experienced forester almost at a glance. All this information is necessary before a complete working plan for harvesting a lumber section can be made. Under the old system such a survey required months or even years. At present it can be completed within a few weeks and at nominal cost. Today the big lumber companies hardly ever acquire timber property without first having it surveyed from the air. Similar surveys at later dates serve as a periodic check on such factors as the extent and seriousness of forest fire or insect damage and the effect of logging operations.

Perhaps the largest user of aerial photography at the present time is the Federal government. Uncle Sam to date has photographed fully 50 per cent of the continental United States from the air, as well as all of Puerto Rico. These photographic records have been found to be particularly valuable in providing a bird's-eye view of the land and its condition and it is believed that they will be of service for many years as a basis for comparing land conditions from time to time and following the trends of land-use.

When the Agricultural Adjustment Administration and the Soil Conservation Service began their nation-wide programs in 1933, they discovered that there was an almost complete lack of large-scale, detailed maps in a great many states. Such maps were badly needed not only for use in making general watershed plans but also for individual farm treatments, field by field. They had to be made up in a short time and yet show every detail. Traverse surveys were out of the question because of their slowness and high cost. Aerial photography was called in to fill the breach.

To date the A.A.A. has mapped about 900,000 square miles of land and the Soil Conservation another 400,000. These maps, together with similar ones made by other government agencies, are being used daily to facilitate the nation-wide conservation program.

Among the other government agencies that have found the aerial survey method of great value are the Tennessee Valley Authority and the Public Works Administration. In 1934, TVA was faced with the problem of preparing a complete new set of maps of the Tennessee River Basin, the old ones being inadequate and of no value in its work of planning. Aerial photography was called upon to do the job. Within eight months 40,600 square miles of ground had been pictured in completest detail and it was possible for the agency to push briskly forward with its program.

The following year the Public Works Administration, which had just finished building Boulder Dam, found that it needed a detailed map of Lake Mead (the reservoir formed by the dam) in order to study the silt deposition of the water held there. At eight o'clock one morning, the day after the gates of the dam had been closed for the first time, an aerial survey company in Los Angeles received a telegram ordering them to rush the mapping of the lake, as it was imperative that one complete set of pictures be taken before any substantial part of the area was submerged. Five hours after the telegram was received photographs of the entire critical area were safely recorded on film!

Comparatively minor users of aerial photography include city and county tax

(*Concluded on page* 68)

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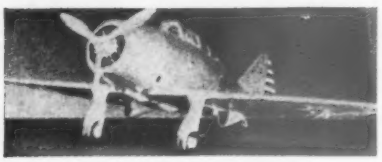

32" Span. Length 23". 1" Scale
Latest army pursuit and 1939 Bendix Trophy winner. Const. set, complete with set of colored paints, full size plans, etc. Flying scale model. Postpaid..... **3.25**

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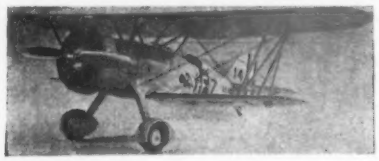

32" Span. Length 25". 1" Scale
Finest equipped model in the world. Set has 4½" scale celluloid motor, aluminum cowl, 10" prop shown, alum. step plates and wing walks, insignia, rubber, complete set of four colored paints, full size drawings, wheels, and parts printed on balsa.
Const. set, postpaid..... **4.50**

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50" Span. Length 38". Color, blue and yellow
Set has all parts printed on balsa, set of colored paints, glue, full size drawings, and all parts to build. Set without wheels, prop, or motor..... **4.95**

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Large 7½ x 10½" beautifully illustrated catalog showing scale army and navy models, gas motors, gas models, etc. Send 10c coin for catalog.

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(*Continued from page 66*)

collectors, farmers and ranchers, town planning officials and archeologists. The tax collectors check their often out-of-date assessment lists against an air picture of the region and easily locate the houses, barns, garages, shops and stores that have been overlooked by their predecessors. In one Connecticut municipality nearly 1,900 previously untaxed parcels of property were thus discovered a few years ago, with the result that the tax list was raised from $20,500,000 to $31,500,000 and the tax rate lowered from $34 to $20 per thousand!

Large-scale farmers and ranchers use aerial mosaics to check on the position of fences, dams and irrigation ditches, the condition of roads, buildings, stables and barns, the size of grazing lands and the extent of timber growths. Planners of towns swear by them because, by showing every tree, green field and possible park-site, they enable them to make the finest possible layout without destroying any of the beauties of the countryside. Archeologists "spot" fossil outcroppings from air photographs, saving the cost of lengthy, often perilous, ground expeditions.

New developments in the field of aerial photography are constantly widening the circle of its users. Recent experiments with natural-color pictures have demonstrated that one can distinguish crops by color and thus quickly measure the acreage of beans, for instance, being raised in a particular location. A new lens, called the Metrogon, is so clear that a picture taken at a height of one mile shows separate railroad ties within a two-mile cycle below the plane and enables a single photograph to show three times as much area as was previously possible. A new safety-type film, unaffected by moisture, has been developed; this does not swell in damp weather and cause distortion as the old type did. Electrically-operated cameras carrying film enough for 250 exposures have eliminated most of the element of human failure in properly timing or spacing pictures. And a novel solar navigator has made it possible for the pilot to fly a perfectly straight course, so that the resulting photographs can be more easily aligned.

This fascinating industry has two great needs at present. One is an efficient yet vibrationless airplane engine capable of reaching a high altitude quickly with many hundred pounds of equipment and of operating there smoothly over a period of five hours or more. The other is for well-trained men—for pilots physically and mentally equipped for this most difficult type of work, photographers capable of operating complicated camera mechanisms under the most adverse conditions and ground men experienced in reading the air pictures quickly and accurately, fitting them together with a minimum of lost motion and interpreting the results with precision and assurance. Here, indeed, is a fine field for the young air-camera enthusiast to investigate—and perhaps get into!

END

"I'd Rather Fly . . ."

(*Continued from page 31*)

airline pilots, a brother-in-law included, envy the liberty which he enjoys in many respects; liberty to make a certain number of individual navigation training flights each year to any part of the country he chooses. "I'm getting to hate the sight of that same old route I've been on for the past five years," his brother-in-law tells him.

A description of the pay and allowances he gets and the work he does might be in order, but first one should look at the type which the recipient represents. He represents one of the not-too-numerous survivors of almost 22 years' continuous flying and of numerous changes of locations and jobs and of the accompanying vicissitudes. He has seen his fellows, not quite as skillful or lucky, succumb to an aerial error in judgment of their own or of some higher ranker, or to a motor failure. He's seen others go under from foreign duty tour in the steaming tropics when the Air Corps was indeed shorthanded and work was piled on work. He's seen others resign in disgust, lacking the stuff to stick. Or others succumb to the lure of Big-Money-On-The-Outside. Not that he hasn't had some close escapes from all the above dangers or temptations. Sometimes he clearly realizes the fact that it is not difficult for a dud, once in the service, to loaf along at a minimum required standard, letting birds like Charley carry them along—a condition which rarely exists in the world of commercial aviation.

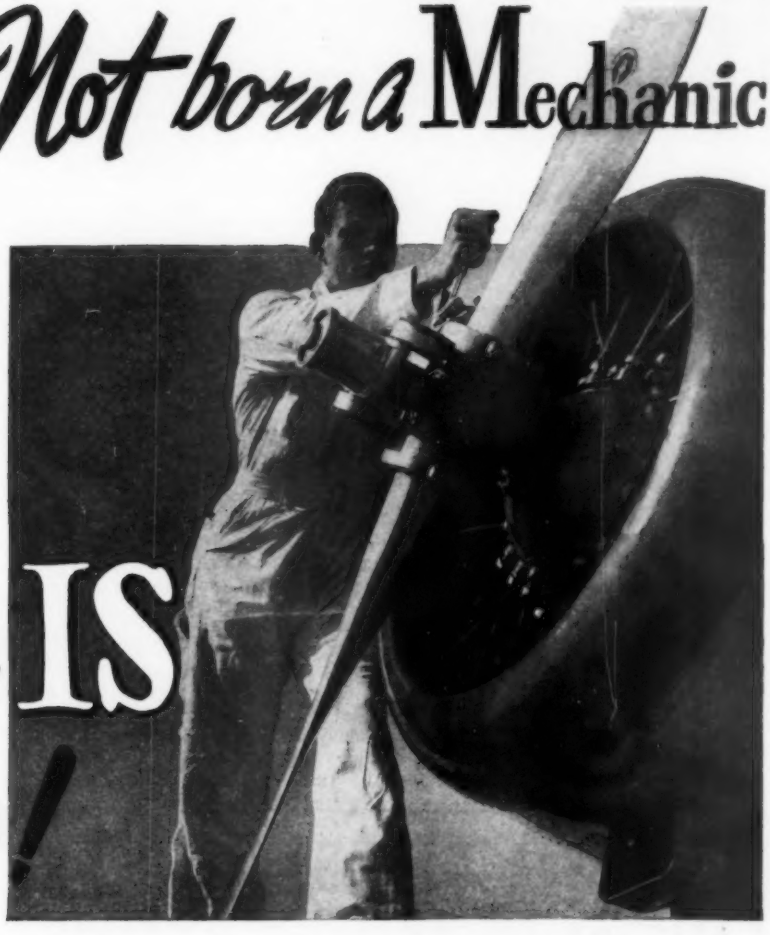
As Operations Officer (S-3) of a very active group in the GHQ Air Force he has charge of flying operations and training for the squadrons in the group; drawing up schedules of training, checking up on the progress of the squadrons, getting out flight operations orders which will not conflict with sound practice, the policies of the group commander, the intent of the Wing Operations Officer, or the capabilities of the participants.

In addition, his duties required him to fly 288 hours last year as pilot and 90 hours or so as passenger or non-piloting member of a combat crew. Few of his pilot flights were over the same route or under the same conditions. In the past three years he has been away from home on maneuvers for a total of three months, with practically no expense account once he got to the scene of the maneuvers. In another year or so he will receive a comfortable boost in pay, but at any time he may lose all that extra pay which he now receives for flying duty, should he fail to pass one of the rigid semi-annual physical exams which he has been taking since 1917.

So you see that Charley has survived a tough elimination contest in his 22 years of service. He laughingly attributes it to luck but, behind it all is a background of physique and temperament. It took an old artillery colonel

(*Continued on page 70*)

He was Not born a Mechanic



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- ☐ FLYING
- ☐ MECHANICAL
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Airmail

(*Continued from page 60*)

have been made, but the average operating record has been 96 and 97 per cent for all scheduled flights over the two routes.

The pilots doing the flying are Holger Hoiriis of Falkland, Del., who in 1931 flew the first passenger across the Atlantic in an airplane (Otto Hillig from New York to Copenhagen); Camille D. Vinet of Glenside, Pa., formerly director of aeronautics for the state of Pennsylvania; Norman Rintoul of Morgantown, W. Va., who has been test pilot for the pickup and delivery service for three years; James Piersol of Williamsport, formerly aviation editor of the Detroit *News* and New York *Times;* and Thomas T. Kincheloe of Sturgis, Mich.

President du Pont and the operations officials of Triple A already are planning extensions of their service to include passengers. Naturally it will be possible to pick up passengers only at communities where there are airports, and stops will be made only on special notice. But the mail pickups and deliveries will be made even with passengers aboard the company's planes—although this has been done only on an experimental basis to date.

On Oct. 30, Hoiriis demonstrated a night pickup on Randall Field before CAA and post office officials. The equipment used was simple. There was a red neon light outlining the flag on top of each of the steel poles, and a 12 foot horizontal bar of red neon mounted on a frame 10 feet above the ground. On Nov. 15 regular night service was started on an experimental basis at Grove City, Butler and Natrona, all near Pittsburgh on the Philadelphia-Pittsburgh route. Lighting at these stations included a range light on each side of the station at a distance of 175 feet from the masts. This light is sufficient to make the station visible from a distance of six miles. Schedules have not been changed due to short autumn and winter days, although these cities are in darkness by the time the afternoon plane arrives on its return flight to Pittsburgh.

President du Pont realizes the enormous field to be tapped Recently he said "The creation, by utilization of the air pickup principle, of a national network of feeder lines carrying mail, express and passengers, as an auxiliary of the present air transportation system through the establishment of radial feeder routes from the major air terminals, is inevitable."

(As this issue goes to press, we learn that plans are being completed whereby Tri-State will start operations into Ohio, Michigan, Illinois, Indiana and Kentucky with regular schedules operating daily as far west as Chicago and as far south as Louisville and Lexington, Ky. Tri-State's original express service will be combined with the pickup system. Meanwhile, plans are being worked out with the Bellanca Aircraft Corporation for a twin-engined transport designed especially for the type of work to be done by Tri-State. Plans also call for the combining of passenger service with that of carrying mail and express.—Ed.)

END

"I'd Rather Fly . . ."

(*Continued from page 68*)

to evaluate him, one chew-the-rag evening on an Hawaii-bound Army transport. "For four years now," said the old colonel, "I have been making decisions, decisions, decisions, at a desk in Washington. Yet seldom have I ever had to call into play the high type of leadership *you* have as squadron leader on that tour you just finished at March Field. If I made a mistake, it meant some clerk, or outfit, or officer worked a bit harder to rectify it; or that money or time was wasted. I had time to weigh my decisions before making a final one. Or precedent or advice to follow. But you've had three years' duty as squadron commander without a bad crash in your outfit. That means you've been making the correct decision, on the instant, with no time or little opportunity for advice, where the wrong order or word would not only effect that precious thing called morale, but might cause the loss of an equally precious life. Don't let 'em tell you that the Air Corps lacks real leaders."

For doing what he does, and being what he is, a captain or temporary major of over 21 years' service, he is entitled to the following monthly pay and allowances:

Base pay	$337.50
Extra pay for flying duty	168.75
Subsistence allowance	54.00
Monthly total	$560.25

In addition he has a set of quarters, a three bedroom house, at the flying field, assigned to him and his family. All in all this is just about the same his brother-in-law makes as captain of an airliner and they both carry about equal amounts of life insurance with premiums of $84 a month. For a number of years, however, his flying relative received much more pay than did Charley, for the rise to the Air Corps officer's present pay rate has been slow and gradual, whereas the airline pilot left the service after four years' duty therein, spent 2½ years as co-pilot and jumped to first pilot with commensurate pay without a break. In another year, however, Charley will outstrip him financially, although his civilian brother-in-law may be boosted into a very responsible position in an executive capacity within the next year or so, with a temporary reduction in pay but the opportunity to struggle to the top.

Contrary to misinformed public ideas discipline, as Charley finds it in the Air Corps, is really a pleasant factor in one's existence therein. Discipline results in

(*Concluded on page 72*)

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JANUARY ISSUE

RADIO NEWS

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(*Continued from page 70*)

everyone doing their job as it's supposed to be done. Charley hardly remembers the last time he was ever bawled out by a superior. It was years ago. Charley wasn't at fault but the commanding officer had stomach ulcers and was that kind of a guy. Charley has lost his temper on several—but short—occasions, the last being when he was almost run down on the aerial gunnery range by another pilot making too short turns in formation and almost sticking his wings in Charley's lap on three consecutive tries. After the flare-up when they had landed the culprit apologized—as did Charley for his red hot vocabulary. They are both good friends, but that is not unusual in any outfit where the social life is so closely bound up with everyday existence as it is in Uncle Sam's uniformed service.

There is a substantial Officers' Mess or Club building on the field where he is stationed and around the mess is centered much of the social life of the officers and their families. Not *all* the social life, however, for most of Major and Mrs. Charley's social relations are centered about their home. But there is a sufficient number of functions of a semi-official nature to drive home to him the fact that he's part of one big (fairly) happy official family, where throat-cutting is practically non-existent.

Not that someone doesn't occasionally pull a fast one. One of the pursuit squadron commanders in the pursuit group stationed at the same field had been referring slightingly to the piloting ability of the "bombsters" whereupon Charley went into a huddle with six of the crack pilots in the bombardment group and, acting very meekly, received permission from the group commander to borrow a few of the pea-shooters on occasions. This went on for several days, the borrowing bombsters putting in some good time practicing far from the flying field. Few will forget the eventful day when the six lads from Charley's outfit hove in sight of the field and, in the borrowed single-seaters, put on a show that has seldom been beat. Nor did Charley fail to give point to the incident by deprecating his juniors' presentation—"too bad some of our *good* pilots aren't up there; then you'd really see something."

His Form V, a transcript of the flying he has done, shows that in the past year Charley has piloted other types besides the bi-motored bombers with which his group is equipped. The C-33 Douglas transport, two types of large amphibians, the Northrop A-17 attack plane, the North American BC-1 basic combat and the P-26 Boeing pursuiter have all been flown by him. Were he to dig down in the records he might find the following airplanes included, during his long flying record: the Jenny, the DH, SE-5, Spad, Nieuport, Thomas Morse Scout, Vought, MB-3, PW-8 and -9, Douglas O-2, Loening amphibian, tiny Sperry *Messenger*, Douglas BT-2B, O-38, Keystone LBs and B-4 and B-6, Curtiss O-1s and A-3s, A-8s and others of the Curtiss attack line, the Martin B-10 and B-12 series and the later types of bombers now in his group.

His group will soon receive a newer type of airplane. Some other plane to look over, to feel out and to master. Or he may be transferred to some other outfit, away from the bombers. That means some other *job*, no doubt. Perhaps as instructor in one of the service schools, a lecturer on air tactics or strategy to other officers. Or a tour in Washington on purely administrative work, or back to Wright Field, where he once had served, for a tour on engineering research or administration. He'll still be given an opportunity to keep his hand in at piloting, even in such jobs, even though it means doing his flying on week-ends or evenings after hours.

Perhaps it is the variety of jobs, flying and non-flying, which helps him maintain his interest in his profession. He cannot conceive of wanting to do anything else. Even during the last leave of absence he took he found his daily 36 holes of golf palling on him after a month. Yet for two *years* he had been on the job steadily before that palled, temporarily, and made him ask for a vacation. Yet you can't say that all work and little play makes him a dull boy. It's just that he gets a kick flying, and non-flying too, for his Uncle Sam.

END

Fog Gone!

A BRITISH professor recently set out to tackle aviation's No. 1 enemy, fog. He evolved what is said to be a fairly successful method of dispelling the kind of fog formed by warm air streaming over cool surfaces. Working at an airport, the professor found he could use either common heating gas or paraffin to produce temperature changes along the windward side of the field. Although the system worked, such large quantities of fuel were necessary that the idea probably will have to be abandoned because of the expense.

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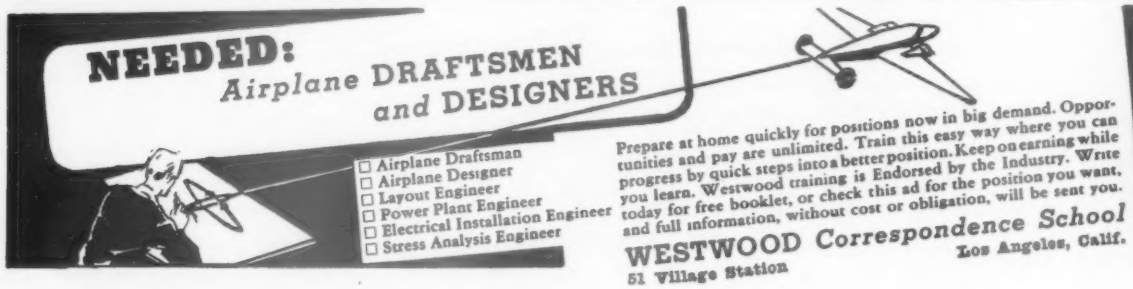

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FEBRUARY ISSUE

POPULAR AVIATION

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Manhattan Air Patrol

(*Continued from page 37*)

of 1938. Until a few months ago the bureau was dormant. A skeleton force of men was maintained to supervise the towing of banners over the city and to investigate aerial accidents within the metropolitan area, but most of the former crew was returned to regular police duty. Then Mayor Fiorello La Guardia and Police Commissioner Lewis J. Valentine decided to rehabilitate the bureau and return to the city the honor of having the only organized municipal aviation police in the United States.

Once again planes were ordered, two this time. The ships were 450 h.p. Wright *Whirlwind*-powered Stinsons. Like their predecessors, they have a green fuselage with a white stripe down the side and white wings. One is a seaplane which cost the city about $19,000. It carries license number NC-21147. Its companion ship, a landplane, has license number NC-21148 and cost $14,641. These planes are capable of top speeds between 170 and 176 m.p.h. They cruise from 150 to 160 m.p.h. They are equipped with two-way radios, blind flying instruments and have an especially large door in the side which permits their immediate conversion into flying ambulances.

After the ships had been chosen it was relatively simple for the city to reorganize the personnel of the bureau. Twelve men were selected from the Emergency Service Division, headed by Inspector Arthur Wallander, who is himself a pilot and was acting Captain of the original aviation bureau. It was decided that these men—six pilots and six mechanics—should go to Wayne, Michigan (where the planes were being constructed) and to Paterson, New Jersey, where the motors were to be built, and work on the actual construction of the planes. This procedure, it was felt, would better fit the men for the care and handling of the ships once delivery was made. Last July, after the city had accepted delivery, the bureau was re-christened at its headquarters at Floyd Bennett Field.

At the field Sergeant Joseph Forsythe, a pilot, is in charge. The other patrolmen-pilots include John P. Hellebrand, J. Q. Friedman, Albert B. Tenzer, Gerald J. Crosson and Gustav Crawford. The patrolmen-mechanics are Arthur P. Walz, Walter G. Reichman, Samuel Leonowich, Walter C. Kolm, Michael L. Weilandt and Michael J. Fabia.

A day in the life of a police pilot may to him be a routine matter, but to an outsider it would probably seem somewhat exciting. Last Labor-Day weekend, for example, the men were flying in two-hour shifts from ten each morning until dark, aiding in control of the traffic which first poured out and then back into the city. The fact that there was extremely little traffic congestion on roads over Labor Day was credited mainly to the competent directions given from the planes.

Each month the planes are in the air on their regular daily patrols for an average of 40 to 45 hours. The patrol schedule depends entirely on weather conditions and the work to be done, but in good flying weather the schedule is staggered so that no one except the department ever knows when the ships will be in the air.

During an average patrol of one hour's duration the police can accomplish a great deal. They check up on the regular airlanes, drop in at the city's various airports occasionally, check upon low-flying reports or other infractions by private planes at the moment and, if traffic is heavy, can within that period give the men on the ground an accurate picture of the trouble.

The manner in which these police ships can straighten out a traffic problem is amazing. By means of the two-way radio sets they carry, they are in constant touch with all radio-equipped police ground forces and, as soon as they see that traffic is beginning to bunch up at any point, they inform headquarters which sends a patrol car to the spot. On occasions, when an inspector rides with the pilot, the instructions to the cars are usually given from the air. The police on the ground, once they know where the trouble is originating, can speed up traffic at that point and soon return the highway flow to normal.

A full-fledged police inspector is usually the highest ranking official to make use of a plane although both Commissioner Valentine and Mayor La Guardia, as heads of the department, have the ships constantly at their disposal. When the new planes were dedicated, Mayor La Guardia, who held the rank of an aviation captain and pilot during the World War—and now is an active member of the Quiet Birdmen, flew above the city for half an hour. During that period he kept in constant touch with his office through the two-way radio.

On only one other occasion has the mayor employed the services of the Aviation Bureau. There were some papers at Roosevelt Field which he needed immediately at the summer City Hall on City Island in the Bronx. A police plane at the field picked them up, flew them across Long Island to the North Beach airport, and turned them over to a motorcycle policeman who rushed them across the Whitestone Bridge to the mayor's office in record time.

Since the new service was put into operation there has been a scarcity of instances in which planes were used for rescuing people in distress, but the log book of the original bureau is filled with sufficient cases to illustrate the need for the service around so large a city as New York. Among others in that book is recorded the case of ten-year-old Jackie Barnett.

One day in November, 1936, the telephone rang at Police Headquarters. At the other end of the phone a voice stuttered forth a story that for blood chilling possibilities was comparable to any that ever came over the wires.

Out on the wind-lashed waters of Flushing Bay an oarless rowboat was

(*Concluded on page 76*)

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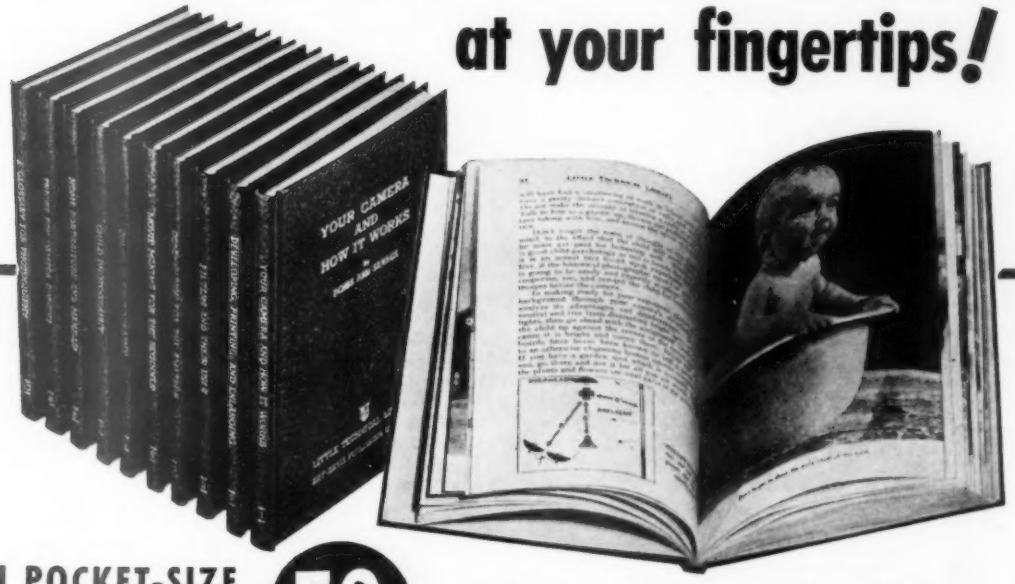

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JANUARY ISSUE

Popular Photography

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(*Continued from page* 74)

drifting. The outgoing tide was sweeping it rapidly toward that death-filled cauldron of tdies called "Hell Gate." In the boat was a small boy crying for help.

"For God's sake," the voice cried. "You've got to get there fast."

The police department swung into action. A police boat quartered along the East River went into action. A nearby fireboat was notified and also headed for the scene. Simultaneously, while with every instant the boy and the boat were sweeping toward Hell Gate, the telephone rang at the flying field.

"There's a boy in a boat drifting from Flushing Bay into Hell Gate," the field was told. "Proceed to the scene and pick him up."

Pilots and mechanics ran to roll out an amphibian. In a few minutes it was in the air. Within ten minutes it had sighted the tiny boat just at the edge of the danger zone. Less than 15 minutes after the original call the boy was safe aboard the plane. If he had had to wait for the police and fire launches to arrive it might have been too late.

Swimmers about New York's crowded beaches are a constant problem to police. On several occasions police planes, by spotting a helpless individual and diving their ship over him, have attracted the attention of lifeguards and saved lives.

At other times the police pilots have distinguished themselves under conditions normally beyond their sphere of activities. One such case is found in the rescue off the Jersey coast of five men from the wreck of the Navy blimp J-3, after it crashed in the water during the search for survivors from the dirigible *Akron*. Another use to which departmental planes are put is in cases of extradition. When the bureau was organized in 1929 one of its first assignments was to fly to the Cape Cod canal, locate a tugboat and bring back the master to face a charge of murder.

In its relation to aviation around New York City, the police aviation bureau fulfills several specific tasks. When planes are reported to be flying low or stunting over the city a pilot is dispatched to investigate. If he finds the charge to be true he notes the plane's license number, warns the pilot to stop and returns to the airport. A report of the incident then is sent to the Civil Aeronautics Authority. The bureau also enforces the regulations pertaining to banner towing by airplanes over the metropolitan area and cooperates with the Department of Docks in regulating traffic to and from North Beach airport and along the waterfronts.

Possibly the strangest use that any police plane ever has been put to, however, occurred several years ago during a blackmail case in the city. To carry on the necessary correspondence connected with blackmail, the crook has resorted to the use of homing pigeons. A plane was assigned to follow one of the pigeons. It did so successfully and the blackmailer was apprehended.

Just what it costs the City of New York to operate its aviation bureau is unknown, for the Police Department will not release these figures. But expenditures are kept at a minimum by the fact that all repair work and maintenance is handled by the patrolmen-mechanics at the base at Floyd Bennett Field. The planes, as a matter of routine, are checked before every flight and the engines are overhauled every 50 hours.

END

New Army Ratings

(*Continued from page* 46)

still is considered competent to direct aircraft in flight even though other pilots may be at the controls.

In the regular Air Corps all Command Pilots who are officers are either majors or higher, or are senior captains soon to attain their majority. Most of them still are competent, however, to actually handle the controls of all or most types of military aircraft, and prefer to do so when possible.

It is no secret that many airline pilots are hoping for the day when the airliner reaches such a size that the captain need no longer hold the wheel and push the rudder bars, or what is more important, be subject to the present rigid physical requirements for pilots, even after long years of flying service. Their careers have been flying careers, in and of the air, and most of them would have it continue so. To quote from one highly-paid pilot: "I'm saving my dough as I go, putting it into a house and bonds. The best I see in sight if the physical gets me is $250 a month in Operations or Traffic, which is higher than WPA but $80 a *week less* than I'm getting now. Sure, I'll take it when I must, but how would a professional man who has spent thousands of dollars on his education and training feel if he knew that at the peak of his career around the age of 50, his income would be cut two-thirds?"

The Air Line Pilots' Association and some of the airlines are alive to the situation and are hoping to work out a satisfactory solution. Perhaps the well-staffed super airliner will furnish it.

END

Sub Spotters

HOW deep into the ocean can an airplane observer spot a submarine? A POPULAR AVIATION correspondent in Europe gathered together a bit of interesting information from, he writes, British, German and Russian sources. After various tests, it is pointed out, it has been determined that a submarine can be seen at a depth of 50 feet—provided the water is smooth and deep, that no strong wind is blowing and that the sun is shining so as to light up the depths of the ocean. But it also depends on the angle which the line of sight from the airplane to the submarine makes with the surface of the water. At unfavorable angles the maximum depth for sighting is only 15 feet.

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Non-Stop to Nowhere

(*Continued from page 20*)

trol. Well, anyway, one wing would go down. Then the nose would get down 10 to 15°. Of course the engine would start to wind up and that would waken you. We found that rarely would we have made a turn of more than 90° before we'd waken. It would startle us and we'd stay awake awhile then.

In rough air you just didn't go to sleep. Once we had a stretch of three days when the thermal bumps were so bad that they didn't smooth out even at night. On those days we'd get so sick that we'd be vomiting constantly. I tell you it's quite a trick to vomit into the windstream without getting it blown back into your face. We had enough chances to find out. The way to do it is to turn only about 45° across the wind stream. That way everything clears the ship.

We were just about dead after those three rough days. We took turns, flying three hours and sleeping three hours until we got to feeling about normal again. That stretch took a lot out of us.

(McDaniels up again.) One of our worst moments came on the sixth day of the flight. It had been one of those warm moist days with a thunderstorm in the evening. One of the most violent electrical storms I've ever seen, in fact. It lasted till midnight. Then came a wind-shift. The air got cooler. You know what followed. That ole debil ground fog. We didn't notice it at first. Then the ground lights got hazy. Pretty soon we couldn't see the airport lights, just a glow of the beacon. We were stuck. We had a pretty good supply of fuel but we missed the 2 a.m. refueling contact. Couldn't chance it.

We throttled back as much as possible and went 'round and 'round, just waiting, hoping the fog would thin out about daybreak. Well it did, a little, I guess. When the light came we couldn't see the airport lights. Finally a hole drifted past and I recognized it as a place near the northeast corner of the field. We went 'round again to that hole and sure enough it was drifting over the field. By that time we were tearing our hair. Our gas was gone. Finally the float indicator in the front tank stopped jiggling. That meant we had 20 minutes gas left.

Ten minutes more passed. Then we began to see faintly the outline of things on the ground. Down we went at the field. Power on, in a slip, nose high and airspeed as low as we dared. And good old Red was there waiting for us in the truck. Boy! was that a grand and glorious feeling. Both of us yelled at the top of our lungs—and they tell us that they heard our Yipeeeeeee for two miles around on the ground—when the first can of gas was snapped to our rope. We pumped that up into the front tank and got 12 more gallons aboard before we quit. By the time we'd refueled the fog was almost gone, but it sure was a close one.

On the flight's seventh day we saw a fire on the ground just at dawn. We'd been circling the town—it was taking us just about 10 minutes to make a complete circle because we were keeping away from town so our motor didn't bother too many sleeping people. The time we'd come around before all had been well there at the southeast end of town. But, on this trip, I saw a fire on the porch of a house. I know the town so well I recognized it as the home of Carlisle Floyd. The wind was just right to take the fire right back through the house. Well, I just rolled the *Cub* over into a steep dive. The airspeed went right up against the top peg. Baxter was asleep in the bunk and he woke up screaming and tried to tear up some fairing we have over the control tubes. He somehow thought they'd jammed and inadvertently put us into the dive.

The old *Cub* began to shake and shimmy with the speed and the Franklin howled like a Pratt & Whitney *Wasp*. We didn't miss that house 30 feet and then pulled right up into a wing-over. I looked down and saw a lot of people in night clothes running out of houses and looking up. They saw the fire, of course, and got the Floyd family out okay, but the house was badly burned.

(Baxter in for relief.) Only other bad moment was the day before the flight ended. It was awfully rough and bumpy on the ground and we had to refuel. Well the *Cub* kept bouncing around pretty badly. We came in once with our airspeed high, but missed the contact. Next time around we were some slower. The ground crew got the tin can hooked to our line but we started to settle. The can bounced over the hood of the car and dragged and bounced along the ground acting like an anchor. With the ship already nearly stalled that damned can was just about our undoing. At the last possible minute, just before the wheels would have touched, we hit a strong gust that lifted us up a few feet and we were able to put her nose down. That saved us.

We had to use some of Harry Singer's bread, in an unusual way. They'd sent us up some ice cream and we tossed out the cardboard container when we'd finished it. One of the caps, about three

(*Concluded on page 80*)

Statement of the ownership, management, circulation, etc., required by the Acts of Congress of August 24, 1912, and March 3, 1933, of Popular Aviation, published monthly at Chicago, Illinois, for January, 1940. State of Illinois, County of Cook, ss. Before me, a notary public in and for the State and county aforesaid, personally appeared A. T. Pullen, who, having been duly sworn according to law, deposes and says that he is the business manager of the Popular Aviation and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit: 1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, W. B. Ziff, 608 S. Dearborn St., Chicago, Ill.; Editor, B. G. Davis, 608 S. Dearborn St., Chicago, Ill.; Managing Editor, Max Karant, 608 S. Dearborn St., Chicago, Ill.; Business Manager, A. T. Pullen, 608 S. Dearborn St., Chicago, Ill. 2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Ziff-Davis Publishing Company, 608 S. Dearborn St., Chicago, Ill.; W. B. Ziff Co., 608 S. Dearborn St. Chicago, Ill.; W. B. Ziff, 608 S. Dearborn St., Chicago, Ill.; B. G. Davis, 608 S. Dearborn St., Chicago, Ill. 3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. 4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. 5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is ..... (This information is required from daily publications only.) A. T. Pullen, Business Manager.
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(*Continued from page 78*)

inches in diameter, caught on the bracing wires at the tail and set up a lot of vibration. We were afraid the wire would snap from the vibration and force us down so we stalled the ship and dived it and pulled up and did everything we could think of to loosen the cap. But no go. Then we thought of the bread. We got a loaf and began throwing slices back at the cap. After a trial or two we got so we could toss them out into the windstream and they'd go back and smack the cap. After it was hit by half a dozen it slid off and was blown away. We used the bread because it was soft and wouldn't damage the fabric; neither would it catch on the wires.

All in all we got a wonderful break in weather. Jim Fiddler, the weather broadcaster with our Muncie radio station WLBC, kept us informed in advance of everything that was coming our way. That was a great help. Jim also gave several daily broadcasts from the airport and acted as special events announcer on the flight for WLW, the big Crosley station at Cincinnati.

During the flight, operators on the airport took 2,200 persons for sightseeing trips over Muncie and 70 per cent of them were first riders. Clyde Schockley credited our flight with rousing most of this interest which is unprecedented here. He says also that there has been a marked increase in the student flying business as a result of the flight.

If those things are true we're really glad. We can only say that we have been very kindly treated by the aviation industry and by Muncie people. A lot of them got together while we still were in the air and agreed to give us $1 a day each for every day, after we passed the record. This amounted to $545.60 for each of us or a total of $1,091.20 from Muncie people. That's a real expression of appreciation from your own folks.

Kelvin now has a total of just over 500 hours. A has 1,026 hours. We split the time in the air 50-50. A is going after his instrument rating immediately and both of us are going to try to get into the Army Air Corps reserves.

(Editor's note: Although the boys didn't bring this up there is one more interesting point about this flight. McDaniels taught Baxter his flying and also was the instructor who soloed every member of the ground crew. The entire working personnel of the flight learned its flying at the Richmond, Ind., airport.)

END

Bombs Per Target

A RUSSIAN military observer recently told a POPULAR AVIATION correspondent some interesting aerial bombing facts gleaned largely from the wars in China and Spain. Russian military aviation experts say that 10 to 15 twin-engined bombers, each carrying between 1,200 and 2,000 lbs. of bombs, are sufficient to sink a ship. A railway station requires on an average of 15 tons of bombs, they point out.

Amelia Earhart

(*Continued from page 29*)

corded during that ghostly interview, with Mr. Putnam's notations concerning some of the answers:

Voice: . . . Fred was not at fault. It unavoidable.

Putnam: Were they killed instantly?

Voice: No.

Putnam: Were you on the plane a long time?

Voice: No. on a reef . . .

Putnam: What direction from Howland?

Voice: Almost directly north. (There are no islands north of Howland.)

Putnam: Is it Kingman Reef?

Voice: Near there. There are Navy planes flying near there now. (This is November. The Navy search ended in July.)

Putnam: What will they find?

Voice: They will find wreckage, in the water, near the island. (Nothing was ever found.)

Putnam: What did Fred Noonan call his wife?

Voice: Fred wants you to tell B. that it was not his fault . . . He is living. (Evasive answer.)

Putnam: Who is living? Noonan?

Voice: He is not dead. He wanted you to know there is no death . . . Maitland. He is here.

Putnam: Is Kingsford-Smith there?

Voice: Yes. Maitland and Kingsford-Smith.

Putnam: Wiley Post? And Will Rogers?

Voice: Yes. Yes. Amelia is among a lot of friends.

Putnam: What about her mother?

Voice: She has not given up hope. (That was true.)

Putnam: Can you ascertain from Amelia what word she used in addressing me? Does the name begin with the letter "K"?

Voice: No, "P."

Putnam: This is important; I want to get this right.

Voice: Pug. Pug or Pugsy. (AE actually gave me a nickname similar to this, although only one or two intimate friends knew it.)

Putnam: What was it that Amelia always carried that she didn't take this time and left with me?

Voice: Her bracelet. (This is true. No one knew but myself.)

Putnam: What country did the bracelet come from?

Voice: Africa. (Only AE and I knew that.)

Putnam: What would she like me to do with the bracelet?

Voice: Keep it. You gave it to her, so you keep it.

Putnam: Will any of Amelia's things, like her watch, ever be found?

Voice: No. Parts of the plane.

Putnam: Will you ask Amelia, please, if she had the Seagraves watch.

Voice: She did not. (Wrong. She did have it.)

Putnam: Where is her will?

Voice: In the safe-deposit box. With the watch. (Wrong.)

Putnam: Ask Amelia if she knows anything about the trip I am contemplating.

Voice: Yes. That is very good. By all means go. (I was planning a cruise. I did go later.)

The seance ended as abruptly as it had begun and George Putnam went home to ponder another mystery. He has had other brushes with the occult in the long months since. Things have happened that defy the laws of nature and common sense and, at the same time, are ridiculous and an insult to intelligence. There was the woman in Los Angeles who dreamed that Mr. Putnam came to her home and showed her a bulky manuscript.

"It looked like the bound proofs of a book," she wrote. "You riffled the pages and I saw the number on the last one. Have you written a story about Miss Earhart, and is it about 266 pages long?"

Mr. Putnam had not. But some months later, when he finished compiling a draft of Amelia Earhart's book, "Last Flight"—it was exactly 266 pages. Was this the power of suggestion? Perhaps. . . .

There was the group of four college women in San Francisco who had long scoffed at psychic phenomena until they sat down one night to "play" with an ouija board. That venture resulted in some 10,000 words of dialogue between them and an invisible power which moved the wooden finger in the name of Amelia Earhart. The board spelled out a vast amount of technical aviation information that required an expert to explain—information that the women admitted was far beyond their understanding. Not one of them had ever flown a plane.

They wrote to Mr. Putnam with a sense of chagrin and foolishness. "At the expense of typing ourselves as a few crazy cranks," one said, "we are sending this material to you. We are ordinarily sensible people who found a game turning into something frightening and mysterious. I wish we knew the answer. . . ."

George Putnam replied, and his answer was indicative of the position he took when the first telegram came, the opinion he still holds today:

"I gather that you regard such manifestations much as I do. That is, with open mindedness and tempered curiosity. Long ago I became convinced, as did Miss Earhart, that there is much on the borderland of things psychic about which we understand little or nothing. We were both always ready 'to be shown.' I have had an extraordinary amount of this kind of communication for many months, coming from sincere people with no axe to grind, no favors to ask. I have told them what I am telling you: I honestly do not know how to explain these things. . . ."

END

He Gets Around

(*Continued from page 48*)

problem. He'd get to see the gold mine more often.

He likes his job. He wouldn't trade it for any one he could think of.

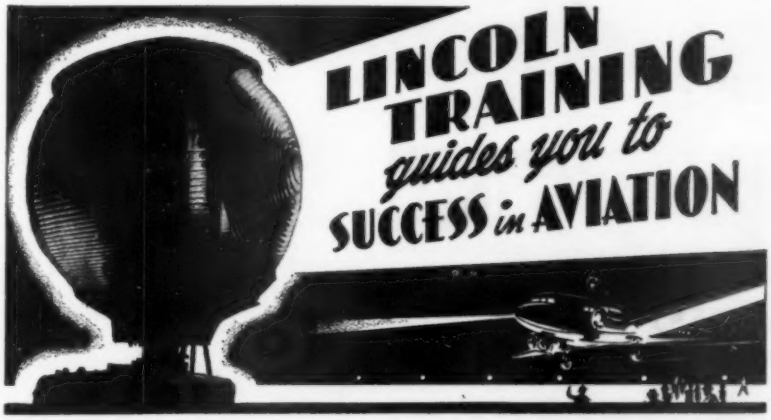
"It would be ideal," he says, "now that I'm a traveling man, if I could go away for two months and be home six months. That's a nice balance."

He does advise youngsters, however: "If you think my job is one that you'd like, learn to fly an airplane. But that's not all. Get yourself a nice degree in aeronautical engineering at some school where they aren't fooling. I've missed that more than anything else in my life. I've picked up all I know by the hit or miss methods and there are a couple of wide open gaps."

When Headle went to school the nation wasn't air-minded and flying courses weren't being handed out on every corner. He had no idea at all about airplanes when he was growing up in the town where he was born, Winthrop, Massachusetts.

"Probably," he says, "I'm the only transplanted test pilot in America who got a degree in horticulture."

He was graduated from Massachusetts State just at about the time the World War started and he became an aviation cadet. He was shipped to Europe,



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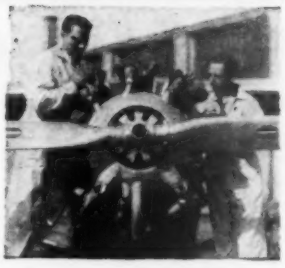

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trained at Tours, never got into combat. He spent three years after the war in France, flying around with a friend who had some airplanes, and then got a commission in the United States Marines. He was mostly in China until he signed as test pilot with Lockheed in 1929, rode through the depression with the company. He recalls when he and the watchman made a great staff—in contrast to today's 5,000 man payroll.

Today, Headle's one dab in horticulture is what he describes as the "greenest lawn in Burbank." He engineered it, but hasn't time to take care of it.

"American kids," he says, "don't know how glad they ought to be. And American young men who like to fly should be especially grateful. Particularly as far as aviation is concerned. Supposing they lived in England. Two hundred miles one way, three hundred the other, and they'd be out over the ocean. And, even with subsidies, flying is more expensive than it is here.

"In other countries there is practically no private flying. That is, compared to the United States. Too many annoyances, papers to carry, borders to cross and too much expense."

There's one idea Europe has which he likes. That's the business of divorcing the combined military and commercial fields, like Templehof and Le Bourget, from private flying. The private flyers—what there are of them—have fields of their own.

"We ought to do it here," he says. "The time's coming when we'll have to."

Headle learned French when he was in that country after the World War.

"Any young man aiming for a test pilot's job should learn it," he says. "With English, French and aeronautical engineering a fellow can get by just about everywhere."

Headle also has become pretty good with the sign language. He contends that when a couple of flyers get together about all they need is that to get along. He hopes that he'll be able to sandwich in a little test flying between his travels. He is looking forward to the new four-motored *Excalibur* (see POPULAR AVIATION, November, 1939) and flying it. It'll take him from two to three months to run the CAA and factory tests on her. He hasn't missed a Lockheed model since 1929 and he doesn't want to now. Let the other boys fan the British bombers up and down the San Fernando Valley as much as they want to—but when something new and interesting comes along he wants to be around.

On the tests, there'll be about one day of dives. The ship will be pushed up to about 400, probably a little better, and then it'll be all done.

"Not much to this test stuff," he says, "as far as thrills are concerned."

Headle, in ten years, has not had a crack-up of any kind. In fact, he reports that the 7,000 or 8,000 hours he's logged in the past 22 years have been singularly uneventful, if you don't count the time he went into an overcast for a test flight and, later, discovered he'd taken off with the compass out of the ship.

"The wings are stubborn," he says. "They never will come off, so I never seem to be able to come home a parachute-jumping hero to my wife."

In traveling abroad, Headle has come to one conclusion. America has fewer airplanes, he says, than the European, but they are of better quality.

"We make up for numbers by producing the finest ships in the world," he says. "That's why everyone else comes to the United States for equipment which ranges from two-place light airplanes to four-motored transports."

In factories, too, we have the jump, he contends. European plants are as big as ours, but they are not as well tooled. "They rely more upon hand work and they can't go as fast as we can when it comes to building," he declares.

END

I Learned About . . .

(*Continued from page* 35)

there wasn't much chance of an accident, simply by comparing the size of space to one small airplane. This scientific principle worked very well. There were no collisions. When we'd finish our circling down we'd come, always within a few miles of the field. Of course, once in a while one of the lads would be surprised, on spinning down, to find himself just over Market street, San Francisco, while somebody else would mutter something about it being a good thing for him he came out of it at a point where Mount Diablo sloped away from his airplane instead of into it. But this was in a spirit of good clean fun.

Here I was, ten years later, up to the same old trick, using those infallible scientific principles directly above Burbank. Flying around, looking for a hole which would let me spin down onto the Sierra Madres, to the north and east of town, down onto the rugged crags to the west, or the Santa Monica range to the south. Of course, there wasn't any hole. I knew there wouldn't be any hole when I started up, but the assistant director had insisted, and here I was, almost four miles up.

Oh, yes? Here was the hole. A nice hole, clear down to the ground. Only it wasn't ground. It was water. Either the town of Burbank and the surrounding mountains had been replaced by a large body of water, such as the Pacific Ocean, or something was wrong with the infallible principle of circling. You can imagine my surprise! Nothing like this had ever happened to Burbank in all the years I had been doing spirals through overcasts.

"Well," I said to myself, "if this is Burbank and the mountains around it, I'd better spin down. I'll have a nice treat for the cameraman. Won't he be amazed to find this big body of water where Burbank used to be?"

So down I came, with camera turning, figuring that at the worst I was 15 miles or so off my city of Burbank. This was probably the Pacific. Down and down I came, with the ship wind-

ing up neatly and the camera exposing some nice footage.

"Frank," I finally told myself, as I levelled off to have a look around below the overcast, "you're nuts. That ocean is surrounded by land—and there isn't any ocean like that near Los Angeles."

As I got down still lower I found that the water was surrounded by desert and mountains. Knowing the surrounding country, I realized—thus topping my original surprise—that I was over the Salton Sea which is, airline, about 150 miles from Burbank!

There was only one answer to all this. All these scientific instruments, such as tachometers and scientific principles, such as the one that if you spiral up and keep on spiraling, you won't go any place and eventually will land where you took off, were wrong. I had picked up a drift of at least 100 m.p.h., and had been whipped 150 miles away from where I was in an hour and a half

I got to thinking. Supposing the drift had been in some other direction and at this particular moment, with a nearly empty gasoline tank, I had been 150 miles at sea? Nice thought. Supposing I'd drifted over mountains which pierced the overcast—there are many peaks rising from 8,000 to Mount Whitney, up more than 14,000 feet—within a 200-mile radius of Los Angeles. Some fun!

Surprised at all this revelation, rather than frightened, I landed at a nearby airport, gassed up and came back to Burbank. I began thinking of all the times I'd taken off from San Francisco, or Burbank, or any place else I'd happened to be at the time and had gone up through the overcast to see how the clouds were, always sure that my spirals were keeping me directly above my point of departure. As I thought about all the screwy things which might have happened to me, I began to get very grateful about the whole thing.

I went farther than that. I recalled all the times I'd done other things, mostly for laughs, just as foolish as this. There was the day I looped close to the ground, levelled off and then flew under some trolley wires. That is, not quite under them. One wing hooked a trolley wire and I messed up a perfectly good airplane. And I recalled the days when I used to sit on the tail of a ship and fly it by means of ropes I'd run to the controls. Or when I'd sit on a wing and do the same thing. I remembered the time I flew a ship off the roof of a Los Angeles office building, getting just enough speed to pull out of it by diving down almost to the tops of lower buildings. And when I made the first plane change from wing to wing without the use of a rope ladder, as Omar Locklear had done.

By the time I got back to Burbank I had decided that I didn't know from nothin'.

"Here are your spins," I told the assistant director. "If they aren't what you want, you'd better change your story to a sea picture—or wait for clear weather."

And so we get to the moral. It is never to try blind flying without the proper equipment.

END

Canada Goes to War

(*Continued from page* 13)

principal cities across the Dominion. This has made, in the year since the system has been in operation, for more efficient work in training and operation of the rapidly expanding air force.

With an eye to the possible need of flying personnel at some time in the future, the Canadian government in 1927 started the sponsorship of light airplane clubs. The government offered airplanes to any clubs which would buy an equal number of planes. The late Sir James H. MacBrien, former chief of staff for Canada, went on a trans-Canada tour organizing clubs. Since then the movement has grown to the present 22 clubs spread from Halifax to Vancouver. From the initial grants of airplanes have grown grants for pilots trained by the clubs. The clubs have grown into propertied bodies, which last year had a total membership of nearly 3,000, had 66 airplanes in use, flying 21,000 hours, trained 231 pilots for private pilot licenses and 51 for commercial pilot licenses. To date the clubs since their inception have trained close to 2,400 pilots for private and commercial licenses.

With the exception of government grants for pilots trained, the clubs operate as private organizations. There is nothing military about the clubs. Many

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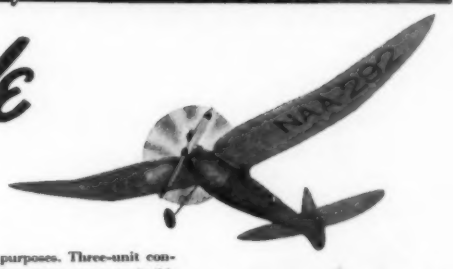

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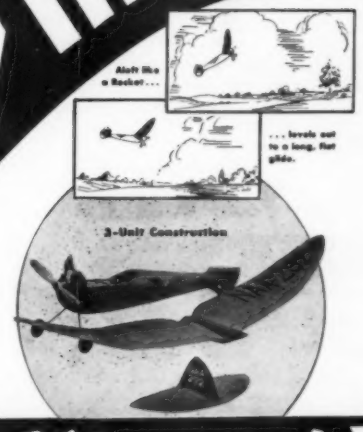

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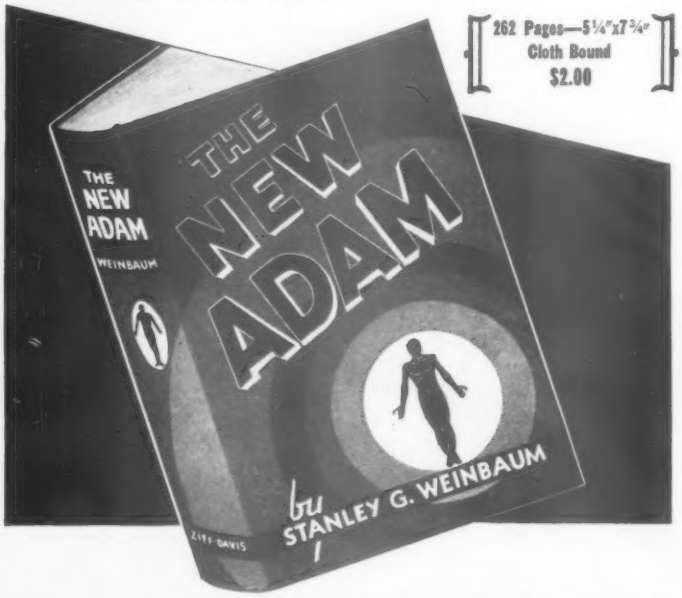

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of the older members flew during the World War and renewed their flying for pleasure. But the government started the clubs as a nucleus for the personnel of the Royal Canadian Air Force and has been successful, even though the air force became but a skeleton body during the early years of this decade. For there came, as a development of the flying clubs, the auxiliary Royal Canadian Air Force units, with about half the pilots from flying club members. Until war broke out the auxiliary units trained during week-ends, members being paid only during such training periods. Now these units, in the principal cities, have been incorporated in the R. C. A. F.

Early this year it was decided to hurry up the training of the many young men who were applying for the air force. The flying clubs were called on to help train recruits. The government loaned two training planes to each club used, the club providing a third plane. Each club was paid about $840 for each pilot trained, including a $200 bonus. After the club training, the pilots received more advanced training at training centers of the Royal Canadian Air Force.

Since the outbreak of war a number of technical schools, which taught aviation mechanics in the larger cities, have been turned over to the air force for the rapid training of ground personnel. Graduates of these public vocational schools as well as those of commercially operated aviation schools have found places in the air force.

It is necessary to point out that Canadian commercial aviation is not being curtailed because of the war and the requirements of the air force. The government-owned transcontinental air service is expanding eastward from Montreal to complete its run from Atlantic to Pacific coasts. Northern flying is continuing. International routes between Canada and the United States are to be increased, according to plans of the two governments, with United States airlines and the Canadian government's airline flying these proposed new routes, principally east of Chicago.

Canadian aviation has a big role to play in the present war. Canadian airmen and airplane mechanics distinguished themselves in the last war a quarter of a century ago. Since then Canadians have made great use of the airplane in opening up their vast country to exploration and settlement and the development of rich mineral resources. Today Canadian aviation and Canadian airmen are ready to repeat the performance of 25 years ago, to fly on the war front, to defend the Dominion's coasts and to produce airplanes in larger numbers than before.

Canada also will be the training center for war birds from Australia, New Zealand and Great Britain, according to an announcement by Prime Minister Mackenzie King at Ottawa on October 10. The Dominion will train annually up to 10,000 recruits from British Empire countries—airmen who will receive their primary training in their own country and be sent to the Dominion for

advanced training before going to the war fronts. "The aim is to achieve by co-operative effort air forces of overwhelming strength," the Prime Minister stated. Main training centers will be in Ontario.

At the same time it was announced at Ottawa that Canada's airplane manufacturing plants would increase their production facilities and press reports from Ottawa stated that as many as 1,200 airplanes are to be manufactured a year in the Dominion.

END

AOPA News

(*Continued from page 54*)

survey the aviation vocational field. Most of the youngsters have an idea they can take a short cut to a job in aviation. Some have been misled as to how they can get such jobs. Some think aviation is all flying. If you, as an AOPA member, want to serve your community, set up an aviation vocational conference. We will help you get talent to conduct it. Your local civic clubs will be happy to cooperate. The AOPA has close contact with the airlines, the manufacturers, the Government, and other sources which will cooperate.

Amelia Earhart Memorial

The tenth anniversary party of the Ninety Nines was dedicated to the memory of Amelia Earhart, Ruth Nichols, AOPA member, announced the creation of a scholarship in the Ninety Nine Club, the purpose of which is to give instrument training to some member selected each year from the club. This is the type of memorial which means something. Many of the Ninety Nines are also AOPA members and the party was arranged by Mary Nicholson of AOPA. It was attended by as distinguished a group as has ever been seen together in the cause of a great aviator. Mabel Walker Willebrandt, AOPA sponsor, delivered the memorial address.

We Are Convinced

Airports spring up and thrive in the most unexpected places. A little Federal aid in dozens of instances would make the average community airport a going concern. It is true that no great commercial privately-owned airport can compete with a municipal field for scheduled business. Yet the small privately-owned airports in outlying communities appear to maintain themselves fairly well. They keep congestion of private flying and student training away from the big commercial fields, thus serving a really important relationship to commercial aviation traffic. Both the states and the federal government would do well to study some plan whereby the privately owned field could be assisted. From a money standpoint such help would be far cheaper than the development of municipal fields in some localities.

The idea of putting landing strips down to serve the sportsman pilot, and for emergency use, is commendable. But aviation will go forward on the backs of the fields that are located *where the most people can go to them* for flight training and airport flying. These are the fields the AOPA is most interested in, for on them the boys of tomorrow will learn to use their wings. They need be no more magnificent than the average sandlot is in relation to the Yankee Stadium. Nobody ever learned to play baseball at the Polo Grounds or at Wrigley Field, but many a star came off the corner lot on Coogans Bluff or South Cicero Avenue.

Winter "Don'ts"

Many pilots develop sinus trouble. Give your face and forehead as much reasonable protection as you can these winter days. The rush of cold air may feel Okay, but it builds up trouble between the helmet and the goggles, or on the cheek bones below the goggles. Instead of heavy clothes in a cramped cockpit, did you ever try tucking a newspaper inside your coat? A pair of paper gloves underneath your ordinary gloves is excellent. Don't let your feet get numb. That is a sure way to trouble. A long peaked baseball or hunting cap is the ticket for these low yellow winter suns. A bit of black off the head of a match or the ashes of a cigarette rubbed just under your eyes will help with the glare. Be sure to adjust your throttle setting to the cold weather conditions on the glide to landings these days. A roller run over the field about this time will make a lot of difference when the field terrain gets frozen. The first thing to do after a rough landing is to look the aircraft over. You can explain why you did it at leisure.

Hotel Service

The AOPA has been approached with the proposition that certain hotels in various cities be designated as AOPA headquarters. We probably will enter into certain contracts shortly which will reflect extremely advantageous rates to AOPA members. Further announcement will be made describing the entire arrangement. Negotiations so far are indicative that, on our group plan, the saving to our membership will be substantial.

CHRISTMAS STILL IS THE 25th OF DECEMBER

And we wish you the happiest Christmas of your life!

END

Design of Engine Mounts

(*Continued from page 55*)

tures. Usually a collapsible mold was used, the engine bearers and the bulkheads were made of 12 to 18 plies, and the outer covering of three-ply spruce, two in geodetic design and one laid lengthwise—all glued with animal glue.

In Section 6 we also see a welded steel tubing mount bolted to the two main beams of a wing.

The advantage of using wood engine bearers was that it permitted locating the engine after the whole airplane was finished for the purpose of balance, with the final drilling of the bolt holes.

Before reliable steel welders were available, steel tube joints were brazed that were nearly 100 percent efficient. This kind of construction was used up to 1910. After 1912 welded steel construction was accepted as a safe design, except that the bearers for inline engines were made of wood, for many engine lugs broke when bolted down.

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With improved engine designs welded steel mounts with four points of attachment (as shown in Section 7) were found satisfactory. But it was assumed that the engine crankcase made the mount rigid, which allowed omission of members that would be necessary if the engine would be fastened loosely. A careful study of triangulation must be followed to obtain a correct design.

Heavier engines have their mount made detachable from the main structure in order to allow sub-assembly or a quick exchange for another unit if necessary. The best time for such a unit (1,000 h.p.) is about 20 minutes. (Section 8 and Section 13.)

To simplify mounting and repair of engines Section 9 shows three detachable brackets and the reinforcing of mounting lugs of inline engines. We cannot pass up the design of engine mounts for fractional horsepower engines used in gas model work. One design is shown in Section 10. Usually hard aluminum or dural sheet is used. The radius of bend should be at least three times the thickness of the sheet and a hole should be drilled where two bending flanges meet.

Many builders have found that duralumin will crack easily when flanged. A simple annealing method is illustrated in Section 11. The sheet is placed over a gas burner, sawdust sprinkled over it and stirred until it becomes dark brown, it is removed from the fire and allowed to cool at room temperature. Then it is ready for easy bending. After a few hours it will return to its original stiffness and strength. This method is called "aging".

Metal structures of airplanes are subjected to crystalization from the steady vibrations of gasoline engines. They may damage the structure very rapidly if the impact of the engine is in resonance with some parts of the structure. Steel springs or air cushions will reduce the impact but will not dampen the vibrations. Mechanical devices are not practical. The only material known that has both qualities is natural or synthetic rubber.

Sketches in Section 12 show various methods of attaching engines to mounts. The support of an engine must be placed between two blocks of rubber and, to make it more efficient, the block of rubber has perforated steel discs inserted. One thing should be kept in mind when designing a rubber pad: the rubber must be able to expand freely in order to be effective and the motion should be tangential to the circle of rotation.

The change of loads and the variation of manufactured airplanes is usually corrected by the adjustment of the tail or tabs. Leaving the tail in its most efficient position for best climb of highest speed, for heavy or light load, the thrust line must be adjusted. Adjustment of the thrust line is well-known among rubber driven model builders; a sketch in Section 14 shows the meanings of up- or down-thrust.

A few airplanes have been built that had engine mounts controllable from the pilot's seat but their results are not known. Lately, however, more and more airplanes have adopted the idea of adjustable engine mounts and the trend in large airplanes is toward an adjustment for up-and down-thrust and another for side-thrust.

END

Haiti's Air Force

(*Continued from page* 49)

to watch the Marines come in. Somehow the populace had heard of my impending arrival and, as I flew into the field, I saw that it was filled with hundreds of my fellow countrymen. They called me "Haiti's Lindbergh" after that.

But I was soon to be disappointed in my ideas of immediately starting a Haitian air force. I had figured that now I could go to work immediately along aviation lines, but instead politics and lack of funds combined to thwart my plans. I finally had to go back to my first lieutenant's job—drilling soldiers in the barracks. But each night after drill I would give them ground school work and flight theory. I found that there were dozens of my fellow countrymen who were itching to fly.

I had many conferences with the president, whose hands are tied, too, on account of lack of funds. We are a very poor country, you see. I told him that both military and commercial aviation should be started in Haiti immediately. I pointed out to him that an emergency was liable to arise at any time which would necessitate our getting quickly from one part of the island to the other.

"It takes at least a week and a half to cross Haiti by car because of the poorness of our roads," I pointed out to him. "In a plane we could do it in one morning." I told him that to get to the Santo Domingo side of the island now takes almost two weeks by car, and that we could do it in one day by plane.

Finally, he consented to my returning to the United States to attend the National Air Races and to look farther into the subject of what are the best type of planes to buy for our land. We have five airports over there, left by the Marines, now standing idle. We would need amphibians, however, on account of so much surrounding water. President Vincent sent the following message to the United States by me:

"In the event of being embroiled in a war the United States can depend upon the Republic of Haiti to provide air bases for its use and the co-operation of that country to aid in the defense of the Panama Canal.

"Haiti is in a strategic position in the matter of Caribbean defense, being but 700 miles from Florida and less than 300 miles from Puerto Rico as well as being close by foreign insular possessions in that area and the northern coast of South America.

"The five existing airports in our land would be put at the disposal of American military and naval planes in the event of a war.

"The five airports are in good condition and there are four men in the entire island who have done some flying, although none but Lieutenant Roy has a license. There are sufficient automobile mechanics who can be readily trained as aviation mechanics and Roy is now instructing some of these men in mechanical courses.

"I want Roy to look especially at light fast bombers and amphibians and also trainers. We need mail planes badly for transportation is so slow."

That is my president's message and his wish. I hope that when I return with my reports it will mean the dawn of a new day in aviation in my republic —the next to oldest republic in the world.

I haven't told you about Betty. Betty is my wife and I met her in Port au Prince, where she had come to establish a hotel on a mountain side, soon after my return by plane to my country. Betty is the former Betty Moore of New York. Her father was a Texas oil man. Betty's hotel is a modernistic building overlooking the entire city. She opened it last Christmas. Betty and I fell in love at first sight and, one day last March, we climbed aboard my plane and flew across the mountains to Puerto Rico, where we were married. Since then we have been running the hotel together, though I go to the barracks every day to train our soldiers.

Now there is a baby on the way. If it is a boy I hope he will be a flyer. Maybe he can do some of the things in Haitian aviation I have wanted to do for so long.

END

Flying Sapphires

(*Continued from page* 28)

be exact—he was employed by the Curtiss Aeroplane Company and the Curtiss Motor Company. He worked for the Sperry Gyroscope Company for five years, and founded and managed the Pioneer Instrument Company for 14 years.

There are many others who have contributed to the growth of Kollsman, Inc.—Wesley C. Bonn, the sales manager, and Alan G. Binnie, the service manager, both of whom are known wherever men in aviation foregather; Charles Crockett, the west coast manager; Leonard Bolster, controller, and Gertrude Adolph, who carries on as both Kollsman's personal and the company's secretary. Miss Adolph has been on the payroll ever since Kollsman walked out of the attic to set up his business on the street level.

Walter Angst, vice president in charge of experimental engineering who was, and still is, Kollsman's first assistant in the shop, is the organization's *enfant terrible*. They have to watch him all the time or he will have the parts of a new tooling machine strewn all over the place. He bears the unofficial title of taker-aparter-in-chief. Let a fresh piece of machinery appear in the plant and Angst is like a small boy with a clock. He always gets the thing back together, of course, after he has calmly and dispassionately dissected it. Angst, an unregenerate fisherman, comes to the plant on his days off to make his own rods and reels and special tackle. His forte as an instrument man is making diaphragms and other fine mechanisms do impossible tricks.

Kollsman "exclusives" in the instrument field are the positive compass or direction indicator and "Telegon" equipment. Kollsman "firsts" are the company's precision electric tachometer, vertical speed indicator, electrically heated pitot-static tubes and the direction indicator.

The company is only the lengthened shadow of the man who founded it. Faced with a problem, he explores every approach. In any factory where he was not lord and master, he would drive a production engineer to drink. He refuses to let production start if he thinks an instrument can be improved beforehand.

Athletic, a bachelor and a man with tremendous powers of concentration, he not infrequently rides to work from his Manhattan apartment in a subway train. Quiet and contemplative, he never makes statements. Once, when he had to put an opinion in writing for general consumption, he relented enough to drop a few remarks which a subordinate had to whip into shape. It was the closest he ever came to breaking his silence.

A visitor to the plant will find officials, as well as the lowliest workman, punching a time clock.

"That's to put everybody on the same footing," is the explanation.

Kollsman's concentrative powers provide some of his subordinates with an open sesame, at times, to their pet projects. When he is free to consider details, he will weigh carefully everything put before him. But when he is engrossed in an engineering problem, he doesn't like to be bothered with administrative cares.

"Yes," he will say to one of his engineer's questions, just to get rid of him.

But it is an even bet that Paul Kollsman, engineer and manufacturer, is remarking to himself as he does it, "That young fellow may produce something."

END

They Build 'Em

(*Continued from page* 46)

of Paterson, N. J., and its 1,600 h p. machine. The young project engineer spoke of three facts that have emerged indisputably from the drive for better powerplants:

1. In 11 years engine performance has soared from a paltry 525 h.p. to 1,600 h.p.—with 2,000 just around the corner.

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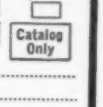

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WANTED: Position with firm or individual engaged in aeronautics. Interested in aviation as career. Knowledge shorthand, typing. Age 19. Robert Consaley, Line Lexington, Pa.

YOUTH 20, would like aviation apprenticeship, can give references. Write. Norman Miller, Lincolnville, Me., R. F. D. No. 2.

ilton propellers described by Arvid Nelson, factory manager of the Hartford, Conn., company, is as holy as speed in aeronautics in 1939.

Wellwood E. Beall and E. G. Emery, Jr., Boeing chief engineer and preliminary design chief respectively, said that "submerged engine installation" mightn't be far distant.

Next moment George W. Brady, Curtiss-Wright propeller division engineer, began speaking boldly of speeds of 300-400-500 m.p.h. In-the-wing engines with proper airscrews, he said, offer six per cent more speed than conventional exposed nacelle types, now in use, at 15,000 feet.

Breath-taking? Even the prosaic stuff, digested, held the promise of an exciting tomorrow. Take Douglas engineer Harold Adams' statement about 3,000 pounds pressure per square inch for ultra-modern hydraulics systems—landing flaps, brakes and seat-lifters. Or the facts about interchangeability of parts offered by Courtney J. Hertel, another Douglas wizard. In wartime, changeability is about as important as the ship's engine itself!

That's the sort of adventuring men wage with pens, sliderules, logarithm books. They don't make headlines. (Did *you* happen to know that this meeting was held?)

But they do make airplanes. Good ones. Safe ones. Maneuverable ones. America's.

END

Aviation Instruction

(*Continued from page 52*)

use in 1941. The flight personnel responsible for the operation of these new airplanes must be trained properly not only for their immediate positions but also to give them the broad experience necessary for advancement to the higher ranks. This is absolutely vital and in keeping with the modern air transportation industry. The airline pilot today ranks with the highly skilled doctor or lawyer. Our school has developed the airline pilot and engineering course, which includes 285 hours of intensive flight training and 3,724 hours (49 subjects) of classroom, laboratory and shop work, to keep its graduates geared to the ever expanding industry.

Flight training is taken concurrently with ground instruction at a ratio of one to seven; i.e., approximately 45 minutes to an hour a day is spent flying, while seven hours daily are devoted to developing the student pilot's technical background. During the 285 hours of flight experience, he receives training in six different types of planes, varying in weight from 2,500 pounds to an eight-ton multi-engined transport. All pilot

ratings and licenses required by the Civil Aeronautics Authority of first officers are acquired during the course. These include the commercial pilot rating, 2S rating (for single-engined planes with gross weight up to 4,000 lbs.), 4M rating (for multi-engined ships up to 25,000 lbs.), instrument rating and second- or third-class radiotelephone operator's license. So important has instrument flying and radio-range work become in modern airline operations that each student devotes approximately 65 hours to this type of training alone. Some of this training is given in the same class of transport he will fly on an airline.

Only by training men who can perform day after day without error, in good weather and bad, can aviation continue to advance. Our graduates must fulfill their obligations to the companies that employ them and to the public which they serve. Is it any wonder, then—since the industry is growing so rapidly—that I say that *teaching methods* must *change too?*

END

Airy Chat

(*Continued from page* 8)

the time, they were quite accommodating to POPULAR AVIATION's readers by calling it quits when they did. Our gratitude is self-evident on page 18.

* * *

THE idea behind our air-war picture feature on page 14 was the result of our getting angry. Like everyone else interested in aviation, we've wanted to know just how modern warplanes are stacking up over in Europe. But the strict censorship of the warring nations forbids any data whatsoever being released on any aircraft. All the unsympathetic censors would release was an occasional photograph of "an unidentified aircraft, somewhere in France." Or England. Or Germany. They refused to say anything else. But, while brooding over our barren pictures, we found we recognized practically every airplane shown. And, having recognized them, why couldn't we supply the information about them? After all, we've been working rather intimately with aircraft the world over for several years. So we dug into our files and out came all the details on the warplanes currently in action overseas. Though the results satisfy us, we'd like to know what readers think of continuing this sort of thing throughout the war. Any comments?

* * *

ED CHURCHILL popped into town the other day. With Dorothy Lamour and Robert Preston in tow. Reason for the distinguished company is that Ed is "one of the boys" at Paramount Studios out in Hollywood. He also is the fellow who's had an article in every issue of POPULAR AVIATION for as far back as we care to remember. So don't be surprised if we murmur something about a sarong occasionally during the next few months.

* * *

You would, too. . . . M. K.

END

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. . . no time now to lose! He was in the water like a seal . . . swimming below the surface toward the powerful Messerschmitt! Barney swung lightly in the surface swell, then cautiously climbed the pontoon, and was in the pilot's cockpit in a flash . . . crouching so he could not be seen by his enemies aboard the Posen! Suddenly there was a sharp cry aboard the ship: "The plane! She's loose!" A shiver raced through Barney . . . his heart pumped like a trip-hammer! He was risking everything on this one bold play . . . and if that failed . . . then once again lovely Pahua would be the base for ruthless war pirates . . . and the sunken treasure of 1918 would be used to turn the peaceful South Seas into a new theatre of naval warfare! Here is a glamourous, exciting novel of the South Seas! Don't fail to read this dynamic story of modern raiders and sunken treasure . . .

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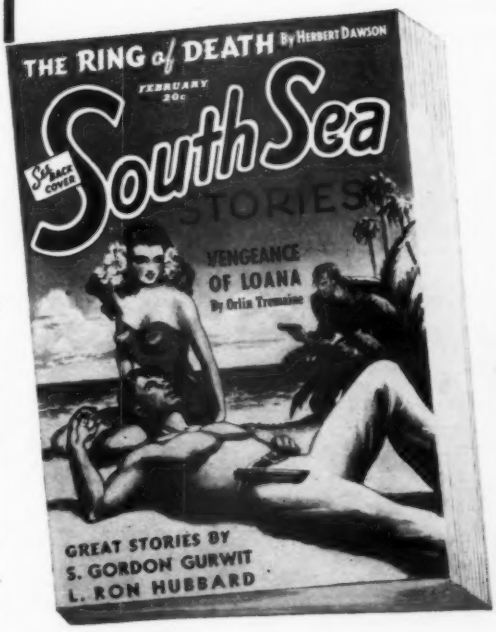

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Jess D. Green

Director, Spartan School of Aeronautics, Tulsa

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It was our belief from the start that the "Chief" is a great airplane—record breaking flights proved it. But the world-wide orders that swelled our production was the real proof of the pudding — we challenged, you compared—and bought.

But, Aeronca is not willing to rest on the glory of this most successful year. Advanced designing and production of still finer airplanes is our constant aim and endeavor to assure your continued acceptance of Aeronca as leader in the low-priced field. Watch Aeronca!

THE PROVEN CHAMPION
AERONCA
MOST FOR YOUR MONEY

AERONCA MARCHES AHEAD IN 1940!

You can count on Aeronca —1940 will bring still greater news of expanding production and new advancements in Aeronca airplanes. The Aeronca organization is geared to give you the best values in airplanes—the most for your money.

★

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